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SUSTAINING ASSOCIATES

Early in each year we write letters of invitation to our Sustaining Associates suggesting renewal of their Associateships for another year. As copy for this issue of the BULLETIN goes to the printer, renewals are being received often accompanied by kind words from busy men. Both the renewals and the kind words brighten the Editor's day and are certainly concrete evidence of the faith of industry and of the future of entomology. Our Sustaining Associates are listed in an issue of the ANNALS and of the JOURNAL each year. They are also found on the back cover of each annual program. We repeat what has appeared in this column before, the Sustaining Associates of the Entomological Society of America deserve the active support of the nearly 4,400 members of the Society.

One of our Sustaining Associates provides the honorarium for the Annual Memorial Lecture, another contributes to the Building Fund, others specify assistance in production cost of the JOURNAL OF ECONOMIC ENTOMOLOGY. This fiscal year the budget for engraving, printing and mailing of the JOURNAL is $33,000.00. Sustaining Associates may purchase reprints in quantity under a procedure set up for their use only. Several of them do so and have found the reprints useful.

Please watch for listings of our Sustaining Associates as mentioned above and in this column as well.

AUTOGRAPHA O O

1961. The sands run and the BULLETIN turns to volume 7. These lines are written on the first anniversary of the move of the E.S.A. office to our College Park home. Moving was difficult but at least we had good weather. This season Washington and the surrounding areas reel before repeated snowstorms that would chill the heart of a polar bear. There are shadows in the swirling snow for [illegible] is a centennial year of regret to the readers of American history. In 1861 Abraham Lincoln became President, [illegible] the Civil War began with the echo of cannon shots in Charleston, in 1861 the First Battle of Bull Run fought. [illegible] hard days to follow—and the Homestead rods in the [illegible] What a boon present day practical entomology would have been in the elimination of the pestiferous, [illegible] and omnipresent louse and flea, mosquito and fly.

PRINTING YOUR MANUSCRIPT. Manuscripts accepted for publication in the ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA or the JOURNAL OF ECONOMIC ENTOMOLOGY normally appear in print in about 5 to 6 months, and except for paid material, in about the order of receipt. As you can tell by the number of pages in your recent copies of these periodicals, there is a steady increase in the quantity of material for publication. Under this pressure the period from acceptance to printing has increased and will probably continue to do so, the number of pages which the Editors can handle properly and the number for which the Society can pay being definitely limited. The Editor of MISCELLANEOUS PUBLICATIONS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA doesn't have this time problem because this periodical appears at irregular intervals and the Editor has complete freedom as to the order in which he wants manuscripts to appear. He can thus regulate the size and number of issues in a volume. The Editor of the BULLETIN OF THE ENTOMOLOGICAL SOCIETY OF AMERICA also has a free hand in deciding when an accepted manuscript is to be printed. This is limited by the procedure now established of printing presidential addresses, annual meeting reports and various business matters in the March issue, the annual program in the September issue, and the membership list in the December issue of odd numbered years. The annual reports of the Branches and of affiliated Societies are among items given precedence. Manuscripts are usually printed in the BULLETIN in less than two years after acceptance.

LANTERN SLIDES. Our good friend Hiram C. Young took occasion to briefly discuss lantern slides, good and bad, at the January 23–25, 1961 meeting of the Southeastern Branch in Mobile. He called attention to an article on the subject written by Past-President M. P. Jones. We wish to echo Mr. Young's recommendation that M.P.'s article be read carefully and observed by all speakers at our various entomological meetings. The article was originally printed in the 1937 JOURNAL OF ECONOMIC ENTOMOLOGY, 30(3):461, and was reprinted in the September 1956 issue of the BULLETIN OF THE ENTOMOLOGICAL SOCIETY OF AMERICA, 2(3):w2. The abbreviations listed on pages vi through x of volume 17 of the INDEX TO LITERATURE OF AMERICAN ECONOMIC ENTOMOLOGY will be found useful in saving space.

ADDRESSES. Please note your address as used to mail this BULLETIN. If it is not correct, including postal zone, please let us know. Unless you live in the general vicinity of our office, our only contact with you is by mail. Please help us keep current. If your mail is opened in your office by anyone other than yourself, please advise that person to watch for third and fourth class as well as first and second class mailings from your Society's College Park office.

BUILDING FUND CONTRIBUTIONS. In previous issues of the BULLETIN we have described the Society's home in College Park and have furnished directions and invitations for any member who wishes to visit us. We have pointed out that the Building Fund as set up by the Governing Board is a deserving and authorized place for tax deductible contributions. In addition we sent member contribution blanks to all members in July 1960 and will send them again in 1961. We appreciate the response received but find it to be much lower than expected. More than half of all such contributions have come from Pacific Branch members. We regard this as a challenge to the members in the other four Branches.

A Paradox in Entomology

A MESSAGE FROM THE PRESIDENT

By F. S. ARANT

ENTOMOLOGY HAS BECOME OF AGE, and professional entomologists are recognized as scientists with training and skills equal to those of other professions. No longer are entomologists considered slightly pixyled nor are they called bug men or butterfly chasers. In fact, a majority of the present members of the Entomological Society of America probably cannot remember when such conditions existed; yet, they did exist in the not too distant past.

Today, the advice and services of the entomologist are sought and utilized by all: farmers, home owners, housewives, gardeners, orchardists, ranchers, dairymen, poultrymen, food processers, foresters, merchants, warehousemen, transportation and shipping establishments, the armed services, health organizations, land-use recreational facilities, schools, architects, construction contractors, and many others—both rural and urban.

The chlorinated hydrocarbon and organophosphate insecticides have made possible phenomenal progress in insect control. The story of these chemicals and their contributions to health, economic welfare, and comfort of man is too well known to require repeating here. There are great opportunities and also great challenges in the further development of effective chemical controls that create no hazards to man, domestic animals, wildlife, or beneficial arthropods. There is need and unlimited opportunity for expanded research on the vexing problems of chemical residues. In addition, insect control through biological, physiological, ecological, radiological, genetic, and other methods is most promising and inviting to the alert investigator. Some of these methods are almost totally unexplored.

Truly, entomology has become of age, and its future is bright; yet, there is a paradox—perhaps several—in the situation. Only one of these will be discussed briefly at this time. Although opportunities are great, actual accomplishments may be curtailed sharply by a shortage of capable, adequately trained personnel in entomology.

Increased interest in automation and greater emphasis on engineering, nuclear physics, organic chemistry, and the space age have resulted in increased college enrollments in physical sciences and decreased enrollments in biological sciences. This trend has been augmented by shifts in populations from rural to urban areas.

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Employment opportunities have also been more attractive in physical than in biological sciences in terms of higher initial salaries. Of 531 graduating seniors employed from one of the Land Grant institutions in 1960, beginning salaries were as follows: for engineers in different specialties, the average salary ranged from $5,976 to $6,276 per annum and the maximum was above $8,500; for those employed in agriculture and related biological sciences (including entomology), average salary ranged from $4,740 to $4,956 and the maximum was $6,000 per annum. Recent announcements from the U. S. Civil Service Commission indicate initial salaries, for inexperienced B.S. degree graduates in entomology, of $4,345 (U.S.D.A.) to $5,335 (U.S.P.H.S.) in the grade of GS-5. At least one division of the U.S.D.A. offers advancement of GS-7 at $5,355 per annum after a 6-month training course at the U.S.D.A. Graduate School; the employee may then qualify for GS-9 rating at $6,435 at the end of an additional 12-month period of experience and on-the-job training. Initial rating for the M.S. degree graduate without experience is GS-7 with opportunity to advance to GS-9 at the end of 12 months.[1] In another division, students rated as "superior" may have an initial rating of GS-7 with the B.S. degree and GS-9 with M.S. degree.

Some reasons for the impending shortage of entomologists have been given, but the extent of the problem is not clear. The Florida Entomological Society recently made a study of trends in entomological training (Rogers 1960). This survey reported a rather sharp decrease in B.S. degrees given by six leading schools offering entomological training. The number of degrees per school averaged 10.4 in the 2-year period 1949–1950 and 5.7 in 1959–1960. There was a slight upward trend in the number of advanced degrees awarded. The shortage may be offset to some extent by a larger number of colleges and universities offering training in entomology.

The need for trained personnel may be much more acute in some phases of entomology than in others. The current emphasis on insecticides, resulting from phenomenal control of insects with chemicals, has channelled relatively large numbers of students into toxicology and chemical control. There is a continuing demand for personnel here. In addition, the entomology profession is handicapped by lack of information on the bionomics of many economic forms, including even such widely publicized major pests as the boll weevil, *Anthonomus grandis* Boh. Extensive research programs are needed in such areas as biology, ecology, genetics, and physiology. There is also a need for intensive educational programs to acquaint the public with the importance of research in these areas, because it is here that the need is greatest and that shortages in personnel may become most acute. In addition, the important area of apiculture is already handicapped by lack of trained personnel. "There is a shortage of trained personnel for work in apiculture, and the shortage is likely to become more acute. For example, 11 out of 18 professional employees in the Division have an average age of 58. Many of the state apiarists are reaching advanced age."[2]

Thus far, only numbers of prospective entomologists have been considered, but the quality of the personnel may be more important than quantity. Are we attracting the most capable students? Are engineering, mathematics, and the physical sciences taking the better students and leaving a disproportionately small number of the better

[1] Information supplied by S. R. Morris, Plant Quarantine Division, U.S.D.A., New Orleans 12, Louisiana.

[2] Quotation from C. L. Farrar, Bee Culture Research Investigations, Entomology Research Division, U.S.D.A., Madison 5, Wisconsin.

students for the biological sciences? Certainly, some of the graduate students currently enrolled in entomology are outstanding individuals; yet, some department heads and student advisors in entomology have expressed the belief that the percentage of mediocre students taking graduate studies in biology is increasing. The situation should be investigated in detail. If entomology is to meet the challenges ahead, it must have an adequate supply of students who are intelligent, alert, energetic, and unafraid to question the *status quo*. It is not sufficient that students excel in social adjustment or have ambitions for employment that offers the best retirement plan. With regard to apiculture, Dr. Farrar stated: "Future apiculturists must have or develop a keen interest in bees, but formal training in beekeeping is not as essential as to have broad basic training in all the biological and physical sciences. Competence for research and teaching requires mental equipment, sound basic training, and a dedication to advancing knowledge in a chosen field." The colleges and universities must select the best raw material available and develop it into creditable scientists.

How may the entomology profession procure the raw material, the students? Is a recruiting program necessary? When the shortage becomes sufficiently acute, the salaries of entomologists will doubtless increase to more competitive levels and the profession will attract larger numbers of competent students. This development could be a slow process, expensive to the entomology profession and doubly expensive to the public. In the meantime, individual entomologists, teaching departments, the various entomological societies, college administrators, the United States Departments of Agriculture and Public Health, and industry can be effective in acquainting students and the public with opportunities in entomology and other biological sciences. Some of these groups are already conducting organized recruiting and publicity programs. These programs should be encouraged and accelerated. There must be increased emphasis on the need for higher salaries. The *Committee on Professional Training, Standards and Status* of the Entomological Society of America is making contributions to the solution of some of these problems. The newly established *Committee on Public Information* can, and no doubt will, keep the public well informed on career opportunities in entomology and also on the importance of expanded basic research. Every member of the Society can and should contribute to the effort.

State and Federal agencies, foundations, and industries related to entomology are establishing assistantships and fellowships in the biological sciences. Funds from these sources are most helpful in stimulating graduate studies in entomology. However, many of these funds would be more helpful if restrictive clauses were removed from the contracts and stipends were increased to support more adequately the many students who are married and have families.

The paradoxes in the bright future of professional entomology are challenges and opportunities—not harbingers of pessimism and gloom. The Entomological Society of America and its branches, affiliates, committees, and individual members must meet these challenges and opportunities.

REFERENCE CITED

Rogers, Andrew J. 1960. Mature Science-Retarded Profession. Florida Entomologist 43(4): 155–162.

MISSISSIPPI INSECT CONTROL CONGRESS

The Mississippi Insect Control Congress met at State College on January 5, 1961. Past President M. P. Jones was a speaker at this meeting. The Mississippi Entomological Association elected new officers at the Congress. Among these were Entomological Society of America members A. G. Bennett as Secretary-Treasurer, W. W. Neel, T. D. Persons and Mills L. Rogers as Directors.

BRANCH MEETINGS

The Southeastern Branch of the Entomological Society of America met on January 23–25, 1961 at the Admiral Semmes Hotel in Mobile, Alabama. Chairman I. J. Becnel presided. This was a well run meeting with excellent press coverage. The Branch members were pleased to have President F. S. Arant at his home Branch meeting. Officers elected were Carroll N. Smith *Chairman*; R. J. Kowal *Chairman-Elect* and John S. Roussel *Secretary-Treasurer*. The 1962 Branch meeting will be moved up and held with the parent Society at Miami November 27–30, 1961.

The Southwestern Branch met at the Grenada Hotel in San Antonio, Texas on February 20 and 21, 1961, with Chairman O. H. Graham presiding. Further information was not available at press time and will be reported in the June issue of the BULLETIN

THE FLORIDA ENTOMOLOGICAL SOCIETY

The Governing Board of the Entomological Society of America has approved the application of the Florida Entomological Society for affiliation. This action was taken at the Atlantic City Meeting and the members of the Board were pleased to have the well known Florida group as an affiliate. As most of our members know, the Florida Entomological Society is the publisher of the *Florida Entomologist* now in its 44th volume.

The last meeting of the Florida Entomological Society was held at the Robert Meyer Hotel in Jacksonville on September 8 and 9, 1960. The minutes of that meeting will be found in the *Florida Entomologist* 43(4):199–204, December, 1960. The 1961 officers are Lewis Berner *President*, W. C. Rhodes *Vice-President*, R. E. Waites *Treasurer-Business Manager*, L. A. Hetrick *Secretary*, John R. King, Andrew J. Rogers and R. W. Baranowski *Executive Committee*, Lewis Berner *Editor* and Norman Hayslip *Associate Editor*.

Andrew J. Rogers was President of the Florida Society in 1960 and his Presidential address, "Mature Science—Retarded Profession," will be found in the *Florida Entomologist* 43(4):155–162, December, 1960. This thoughtful paper is recommended reading for all entomologists.

HONORING ROY E. CAMPBELL

On March 31, 1960, Roy E. Campbell retired from the federal service after 46 years in the Entomology Research Division of the Agricultural Research Service. He was president of the American Association of Economic Entomologists in 1951. The entire staff of the Fruit and Vegetable Insect Research Laboratory at Whittier, California, gave a dinner in his honor on March 30th and presented him with a large portable barbecue and various articles of chef's equipment, so that he can take up outdoor cooking as a hobby in his retirement. Roy's kindly presence will be sincerely missed at the Whittier laboratory.

At their June 3rd meeting in Alhambra, California, the Entomological Club of Southern California also honored Roy on the occasion of his retirement as Permanent Secretary of that organization. He helped to organize the Entomological Club 36 years ago, and it now has some 350 members. The Club presented him with a Bolex movie camera with the latest Zoom lens, a Bolex projector, and several long trips to various parts of the world, including Tahiti and Hawaii, so the *movie* camera will be especially useful! Roy was also presented with a bound volume of letters with good wishes from his many friends in southern California and in all parts of the country.

BUTTERFLY LADY

Monroe, Wisconsin has a well known citizen called the Butterfly Lady. She is Mrs. Emil Stauffacher. She has an extensive Lepidoptera collection in her home and according to the public press is doing an excellent job in entomological education among the youngsters of Monroe.

Selling Insect Control

By M. P. JONES,[1] *Entomologist, Federal Extension Service*
United States Department of Agriculture

THE AMERICAN PUBLIC TODAY IS THE HEALTHIEST, best fed, and best clothed this world has ever seen. Never before has any people had so much food of such high quality at such reasonable prices.

This enviable position has become possible in large measure, because of farmer acceptance of pest control.

Research entomologists developed the methods the public uses for pest control. Extension entomologists translated these findings for public use. The public adopted them. This is the simple success story for much of our bountiful harvests. This helps illustrate the contribution of entomology to human welfare.

We have been telling ourselves and others this story in one way or another for a good many years. We have been saying that knowledge of insect control in the United States has reached such a high level that little remains to be done except to keep that knowledge current. We apparently are creating the impression that all research has to do is to develop new insect control methods and these automatically will be incorporated into the public's insect control efforts. We may have done a better job selling ourselves than we have the public we serve.

Three rural sociologists, George Beal, Joe Bohlen, and Daryl Hobbs of Iowa State University, recently reported results of an inquiry they made into farmer attitudes toward agricultural chemicals. The figures are for the years 1955, 1956, 1957, and part of 1958. The results of their work should be most disquieting to all of us.

They found general approval for the use of agricultural chemicals. But only 6 percent of the farmers sampled said they used chemicals to increase farm profits. Only 20 percent of them said they used chemicals to increase yields. The largest percentage said they used chemicals because it was the "best way to get rid of a nuisance and/or to control pests." Only 14 percent said they used crop insecticides in 1957 and only 30 percent said they used soil insecticides that year.

If we consider only this portion of the report, it should be enough to question the depth of penetration we are getting with our efforts to inform farmers why they should control pests, particularly when 15 percent of the Iowa farmers said they were too busy to use them. As the authors of this study point out, the profit motive is implicit in many of the answers given by the farmers for using chemicals, but the answers indicate a serious weakness in getting our message across to those who received it most of the potential economic value of pest control.

Should this be true of chemicals, our rating for getting across insect control through biological agents, crop rotation, land and water management, resistant varieties of plants and other cultural practices certainly must be even lower. This must be so, because it takes even more planning and knowledge and time to control insects by these practices than it does to control them through use of chemicals.

If the Iowa sample reflects a universal picture of insect control throughout the United States, we are not doing an effective job of getting farmers to adopt the information we have accumulated.

Insect control should play a larger part in farmers' efforts to overcome costs of production than it does today. Insects still take at least four billion dollars out of our annual agricultural production. A sizeable portion of this is recoverable. Using these figures as a measure of our success in selling the importance of insect control, we can hardly rate our efforts at more than 25–30 percent of the potential, despite the fact that the county extension agents assisted American people ten million times with problems in insect control during 1959.

The earliest workers in extension entomology nearly a half century ago, had the task of demonstrating that certain insects could be controlled. They also tried to teach farmers how to identify economic insects and to recognize the damage they do. At first, they confined their insect control efforts to high value crops such as fruit and vegetables where returns were greatest. Production of quality commodities demanded use of insecticides even in those days and our information efforts were accelerated by economics. The next step was to fill the demand for timing schedules so farmers could obtain maximum pest control by applying insecticides at the right time. The Extension Service did much to fill this demand, with cooperation from other State and Federal agricultural agencies and industry. Our spraying and dusting schedules for these crops are evidence of progress in disseminating seasonal information. Control of insects in cotton had much the same pattern of development; yet, it was a matter of economics even for cotton insect control.

Insecticides available then were not efficient enough to control pests of forage, field crops or forests. Farmers relied largely on cultural practices and mechanical means for insect control. They couldn't do much to control insect parasites of livestock. Introduction of organic insecticides brought control of insects affecting these crops and livestock within the range of profitable practice. We all realize this, but I do not think we have made the necessary shift in emphasis in our informational and educational programs to impress farmers with the practicability and profits to be obtained from the combined use of cultural practices and insecticides in field crops, forage, livestock, and forests. Based on available evidence, we have not.

Several factors influence farmers to resist insect control in field crops. The large acreage involved discourages farmers. So does the investment in chemical application equipment. The total yield very often is in thousands of bushels—or in tons. A small percentage of loss due to insects is not measured in terms of profits. Unlike the perennial insect attacks on cotton, fruit, and vegetables, the insect populations affecting field crops fluctuate more from

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[1] Address of the President of the Entomological Society of America, presented at the Annual Meeting held in Atlantic City, N. J., November 28–December 1, 1960.

year to year and during a given season. In only extreme cases is a farmer apt to lose an entire crop of hay or some other field crop. Farmers thus have adopted a "wait-and-see" attitude. Perhaps we should increase our efforts toward breaking down this attitude. We cannot do this without convincing facts on yields and profits to be attained with properly-timed insect control.

The fruit and vegetable grower already is conditioned to programs of preventive insect and disease control. So far, we have not convinced field crops producers that preventive pest control is necessary or that they can reduce production costs by this means. We must convince farmers of the importance of spot treatments or treatment of field margins as the only economical way to obtain profitable returns when the overall loss without treatment is marginal—say 5 percent or less.

We must teach farmers to look for the beginning signs of those damaging insect populations which can explode into serious proportions during a season. Even the most discerning entomologists fail sometimes to predict what insects will do. By the time farmers recognize a serious infestation, it often is too late to gain the greatest value from the use of insecticides.

There are instances in which no incentive is offered farmers to control insects. We cannot expect farmers to use insecticides when there is no profit in doing so. What incentive is there in controlling insects in stored grain, when elevator operators do not pay a premium for clean grain, or degrade grain with light but potentially serious infestations? Livestock producers have little reason to control cattle grubs, if buyers do not pay a premium for grub-free beef, or share in the cost of treatment.

Fewer and fewer farmers produce our commodities as they become more and more efficient through pest control and other farm practices. Support for funds to do research and education in insect control may depend more and more in the future upon an understanding of insect control problems by nonfarm populations. Urban and suburban dwellers have become increasingly isolated from the farm and the attendant problems of feeding, clothing, and sheltering today's 180 million people and the 230 million expected by 1975. Convincing this huge audience of the necessity for pest control will be many times more difficult than trying to convince farmers who have a direct interest in such efforts. Yet, in 1957 nearly 3 million people, largely from urban areas, were assisted by the Extension Service in controlling insects of the household, flowers, and ornamentals. Unfortunately, they do not relate their requirements for pest control about the home with the farmer problem of protecting crops.

Most people today obtain their food only from supermarkets. They almost never see a head of cabbage partially eaten by caterpillars. Young people may never have seen weevil-infested flour and breakfast foods. They probably think the worm in the apple is a legend. We have raised the standards of food quality to a point where average individuals have little reason to believe there is an insect problem. Support for insect control cannot be expected from these individuals unless we make a real and concerted effort to explain necessity for pest control to them. In most cases, the explanation will have to be dramatized.

I've heard it said that entomology needs a huge and destructive outbreak of insects to put entomology back in the consciousness of our people. Our efficient research and pest control organizations, backed by industry have produced such defensive weapons to combat such outbreaks in such a relatively short time that the days of extensive outbreaks of destructive insects in this country are probably gone. We thus cannot even depend on such outbreaks to obtain and sustain insect control support from the general public.

Lack of real public understanding of modern farming methods, including chemicals and their regulations, creates fertile ground for fear campaigns which undermine public confidence in our present food supply. We have had this emphasized recently by publicity on pesticide residues. We can expect more of this if we do not build trust in use of insecticidal chemicals. If we permit our information to drag or lapse that vacuum will be filled by unqualified people who are always ready to talk or write about insects, or by others who have special interests which are antagonistic to pest control, however well executed.

Do we have enough entomologists to fill this vacuum and service the public with adequate and sound information about insects? During my professional lifetime, of some 35 years, the number of extension entomologists has increased fivefold. This increase provides an average of only one and one-half men per State—one entomologist for each 150 county extension agents. Every county extension agent is in a key position to disseminate information on insect control. The effectiveness of a county agent, however, depends on the adequacy of the training and the information he receives from the extension entomologist. Furthermore, entomology competes with other responsibilities requiring the county agent's time and attention. The limitations of extension in providing education in insect control are pretty well defined.

Our 4-H Club work is an important county agent assignment. Since the National 4-H Entomology Awards Program got started 8 years ago, about 250,000 4-H boys and girls have enrolled in the entomology project. These young people will be in a better position to speak on the merits of entomology a few years hence in the Halls of Congress, or as part of the urban population.

It is the responsibility of all entomologists—industrial, research, control and regulatory to inform the public properly in relation to insect control. Every one of us must assume this responsibility. Entomology lacks funds to carry out essential research in insect control. What better showcase for research than the screw-worm eradication program in the Southeast, or the recently announced synthesizing of the gypsy moth sex lure? These contributions came from research. Man's ultimate conquest of his environment can only come about from knowledge gained through research. If it becomes necessary to go directly to nonfarm people for funds to support basic research in entomology, public understanding is particularly important.

The trend toward scientific advisory bodies to guide legislators is advantageous in evaluating use of chemicals in agriculture. The system provides a respected body which can act as intermediary between scientist and public. President Eisenhower's committee on chemicals and foods recognized the value of scientific judgment in considering the suitability of chemicals used in food production and processing. This system is already recognized in law by the Federal Food, Drug, and Cosmetic Act.

We cannot, however, expect these committees to assume our responsibilities. We have an obligation to coordinate and interpret our research findings and control recommendations in terms of economics. When a newly introduced insecticide can increase yields as DDT in potato production, we should anticipate what might happen in the markets and make that knowledge a part of our recommendations. We, at least, owe that to farmers.

To bring about public recognition of the importance of entomology to our standard of living, it may be necessary to turn to the rest of the world where insect control can still obtain dramatic effects. The United States and the United Nations are both committed to the problem of helping fill the stomachs of the hungry and starving people throughout the world. There is no better way to do this than by insect control.

The World Health Organization has blazed the way with control of malaria and other debilitating diseases transmitted by insects. Millions of people have been saved from illness and death through the control of disease-bearing insects. Unless these same people have enough to eat, they cannot fill their potential as supporters for our way of life.

It has been my privilege to work with some 500 agricultural missionaries of many denominations and from many

parts of the world during the past 15 years. These people have one question in common. "How can we control insect pests?" Among other problems, they tell one story. "It is virtually impossible to grow vegetables because insects harvest the crops. Can you imagine how monotonous our diet would be without fresh vegetables?" Nutritionists would be the first to recognize inadequacies reflected in nutritional diseases.

A good portion of the hungry of the world competes directly with insects for their survival. Entomologists through insect control practices should be able to add at least 30 percent more calories and unpredictable additional nutritional values to the diet of these people. The "feast and famine" routine is a cruel reality to these hungry hordes. It is practically impossible in many areas of the world to store food for any length of time. The only way people in tropical areas have food is to beat the insects to it. Many pests enter grain in these areas while it is growing in the fields. This multiplies the problem.

Stored-grain pests are a serious problem in India where the khapra beetle and other grain pests destroy huge quantities of grain. Most cereals in that country are used for direct consumption. There is not enough to convert to animal proteins. There simply is not enough to feed humans, let alone enough to feed animals to convert the cereals into milk, meat and eggs.

The contributions entomologists have made to locust control are spectacularly effective in the Near East and Northern Africa. This, however, is only the beginning. Right at our doorstep, the torsalo fly causes mortality up to 70 percent of the calves of Central and South America. Argentina has lost as many as 50,000 calves in a year due to screw-worm since they have no effective control program for this pest. Yet we in the United States have eliminated it, a much more difficult problem, from the southeastern United States. These are but samples of the harvest that goes to insects rather than to people.

What better goodwill could we possibly export than a gigantic extension program of teaching the hungry people of the world how to wrest the food they need from the insect hordes. We know after nearly 60 years of experience in extension work that such programs can be successful. The farmers would do the work and could see immediately the dramatic results. We could win friends around the world by establishing such a program, and reflect credit on our profession. Exporting know-how in pest control could be the answer to our moral obligation to the world's hungry people and create the atmosphere of trust we need so badly for the future of the United States.

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

Notice of proposed use of Plenary Powers in certain cases (A.(n.s.)46)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in *Bulletin of Zoological Nomenclature*, Vol. 18, Parts 1–3 to be published on December 5, 1960.

(1) Suppression of 56 generic names published by Meigen, 1800 (Insecta, Diptera) (Z.N.(S.)191);
(2) Validation of the generic name *Myelophilus* Eichhoff, 1878 (Insecta, Coleoptera) (Z.N.(S.)467);
(3) Designation of a type-species for *Euceraphis* Walker, 1870 (Insecta, Hemiptera) (Z.N.(S.), 1363);
(4) Validation of the generic name *Perla* Geoffroy, 1762 (Insecta, Plecoptera) (Z.N.(S.)1451);

Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before June 5, 1961. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the *Bulletin of Zoological Nomenclature*. Those received too late for publication will, if received before June 5, 1961, be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows:

The Secretary,
International Commission on Zoological Nomenclature,
c/o British Museum (Natural History),
Cromwell Road,
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W. E. China, *Assistant Secretary*
International Commission on Zoological Nomenclature
October 1960

ANNUAL REVIEW OF ENTOMOLOGY

Volume 6 of this widely acclaimed series appeared in January 1961 and copies went to more than 800 Society members. The Society has a real interest in this fine series. The Editor, Associate Editor, and Editorial Board are well known Society members, the Society subsidized the Review over a 4-year period to a total of over $9,000.00 and we now act as an agent for the book. We can furnish the latest volume, or any of the earlier volumes or a complete set. Sales of this book by the Society help support our efforts toward the betterment of entomology.

EXTENSION WORKERS HONORED

Mr. M. P. Jones (USDA), Mr. W. A. "Jerry" Ruffin (Alabama), and Mr. K. L. "Kurby" Cockerham (Louisiana) were recognized and complimented for their outstanding contributions to agricultural extension on October 12, 1960 at Beltsville, Maryland. The event took place during the lunch hour of a conference of extension entomology and plant pathology specialists from southern and eastern regions of the United States. These men will be retiring before another training conference of this type is again held in Washington. Those attending thought it appropriate to take the opportunity to thank them for their guidance, leadership, and contributions they have given for so many years of work.

On Friday, October 14, 1960, at the same conference, Miss Helen Robertson, Secretary to M. P. Jones, was also commended and thanked for the excellent job she has performed through the years in the Washington office. Her service of duty and devotion to her job has also been outstanding. "Miss Helen" expects to retire sometime in 1961 and we will all miss her.

Respectfully submitted,
Lloyd E. Adams,
1960 Chairman, Section F
Sub-Section a, Extension

NEW DEPARTMENT AT CALIFORNIA

Of interest to all entomologists is the recent announcement from the University of California that as of July 1, 1960, a Department of Insect Pathology had been established on the Berkeley campus of that University

The new department, an outgrowth of the former Laboratory of Insect Pathology, is responsible for conducting basic research pertaining to the pathology and microbiology of insects and other invertebrates. It will also be concerned with all applications of insect (invertebrate) pathology and microbiology other than those relating directly to the use of microorganisms in the biological control of insect pests. These biological control applications will remain in the Department of Biological Control of the University. By means of the new Department of Insect Pathology it is intended to enhance the emphasis and activity relating to fundamental research on the diseases of insects and other invertebrates. The Chairman of the new department is Edward A. Steinhaus, formerly Director of the Laboratory of Insect Pathology.

The Challenge of Insecticide Resistance[1]

By A. W. A. Brown

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One of the significant features of the 20th century has been a massive increase of insect control by chemicals, an exercise in applied entomology and chemistry; another has been the appearance of insecticide-resistance, a consequence of general biological principles. It is typical of the generosity of Americans, who have played so leading a part in the development of the one and in research on the other, that they have chosen a Canadian to describe them in their Memorial Lecture. This honor is taken as a token of the high regard in which entomology in Canada is now held. It also offers the opportunity of paying tribute to J. H. Comstock, who founded the Department of Entomology at Cornell University which has been Mecca to so many Canadian students.

Men of Comstock's generation and quality, —and his appearance reminds us of Buxton of England, von Frisch of Germany, and Caesar of Canada—, are an abiding source of strength to us, their students and admirers. For the strength of Comstock is that he advanced his field, and this is no job for a faint heart. Appointed as an Instructor in Invertebrate Zoology in 1874, he at once made himself useful to his state and country. A two-years' leave-of-absence with the U.S. Department of Agriculture in 1879–81 resulted in an Entomologist's Report containing descriptions of many important scale insects. He returned as Professor and Head of a new Department of Entomology. In 1895 he published his *Manual for the Study of Insects*, whose 701 pages were embellished with the drawings done by his wife Annie B. Comstock, who thus set the example of marital cooperation which has helped many an entomologist to this day. Other books included his *Insect Life* (1891), his *Manual of the Butterflies of the Eastern United States* (1904) in collaboration with his wife, and *The Spider Book* (1912), now revised by W. J. Gertsch. His greatest formal work, *The Wings of Insects*, was published in 1918, following a monograph written to the same title in collaboration with J. G. Needham 20 years previously. But it was in 1924, fifty years after his appointment to Cornell, that he produced his classical *Introduction to Entomology*. Actually his first book to this title had appeared in 1888 but had been long out of print; so Comstock revised his compendious *Manual* and made it into the famous textbook *An Introduction to Entomology* which has far outlived its author, who died in 1931 at the age of 82; G. W. Herrick took it into its present ninth edition. We cannot help wondering what J. H. Comstock would think of developments in the entomological field in the 15 postwar years. Probably he would approve of the recent appointment to his department of the Canadian chemist R. D. O'Brien, for he was one to recognize good basic research and would appreciate the importance of those frustrated chemical-warfare agents that have spawned the organophosphorus insecticides.

A. W. A. Brown

The role of entomologists in human affairs has been vastly increased by the development of these chemicals of differential toxicity known as insecticides. The part they play in the prodigious agricultural output of the U.S.A. is well-known, but perhaps we should say something of their use in the rest of the world, comprising as it does the other 95 per cent of the human race. Application of parathion and other OP compounds against the rice stem borer has so increased the rice crop of Japan and other Asiatic countries that it more than keeps pace with the increase in population. Aerial spraying with dieldrin or BHC now protects the countries of the Middle East and Africa against the age-old plagues of migratory locusts. Cotton production, whether in Sudan or Pakistan, demands the same insecticides as the American South, and the production of clean apples from South Australia, South Africa or Syria relies on the same series of toxicants as New York or British Columbia.

It is in the field of public health that insecticides have made the most significant contributions of our times. For this reason Paul Müller was awarded the Nobel Prize in Medicine in 1948, since DDT offered such an improvement for health in the tropics. The chlorinated hydrocarbon insecticides have provided a means whereby it is economically feasible to combat malaria, a disease formerly responsible for half the world's deaths, by applying residual sprays to every human habitation to kill the *Anopheles* mosquito vectors. Eradication programs, united under WHO (World Health Organization), have been so successful that now one-third of the world population is entirely free of malaria, and another third including our neighbor Mexico has eradication within its grasp. The greater part of the cost has been met by the United States through its contributions to the United Nations special agencies UNICEF (United Nations International Childrens Emergency Fund) and WHO; but in addition this nation through ICA (International Cooperation Administration) directly supports malaria eradication programs in almost half the world's countries, from the Americas to the remotest parts of Asia. The continuing fight against exanthematic typhus is based on the treatment of clothed personnel with DDT dust to kill the body lice, as demonstrated so dramatically at Naples in 1944; and now the remotest Iranian villagers may be protected by DDT or BHC dusts. Flea control with direct sprays or dusts applied to rat-runs has protected the great Asiatic ports such as Hong Kong against the ever-present danger of plague. And treatment of rivers with 1 part DDT to every 10 million parts of water, a technique first developed in Guatemala and Canada, has achieved eradication of the *Simulium* vector of onchocerciasis in certain regions of Africa such as those bordering the Victoria Nile. It seemed that the populations of the insects then existing were remarkably susceptible to the toxic action of the chlorinated hydrocarbon insecticides.

However in 1908, fifty years after the publication of Darwin's "Origin of Species", there appeared a warning that the selective action of insecticides could leave populations which developed into resistant strains. It was in the state of Washington that strains resistant to lime-sulphur first developed in the San Jose scale, an introduced species described as *Aspidiotus perniciosus* by Comstock 38 years previously. Melander and H. S. Smith recognized their nature, that they were resistant populations of a normally susceptible species that had developed in certain orchards as a result of the selective action of the toxicant killing off the susceptible elements of the breeding stock. Subsequent experiments have proved that resistance does not spring from the possible alternative cause, a habituation or adaptation during the life-time of an insect that is inherited by the offspring. Any amount of small sublethal doses will

[1] 1960 Memorial Lecture. Presented on November 28, 1960, at the Annual Meeting of the Entomological Society of America at Atlantic City, N. J.

not make the insect more resistant to a subsequent decisive dose; it usually makes it more susceptible. A resistant strain cannot be developed by treatment with a level of insecticide which causes no mortality, but let it be increased to a selective level inducing partial mortality, and resistant strains are liable to develop progressively over a succession of generations so treated.

During the period between 1908 and 1945, only 13 species of insects or ticks developed resistance in certain of their populations (table 1). Most important was the resistance to hydrogen cyanide developed by three species of scale insects in California, and the resistance to arsenicals developed by the codling moth, the peach twig borer and two species of cattle ticks. Other species developed resistance to tartar emetic, cryolite, selenium and rotenone. No systematic tests were made to ascertain whether the resistance was specific to the insecticide concerned. At least the arsenic-resistance of the codling moth in Colorado was not due to a greater tolerance of ingested arsenic, rather it was a case of the newly hatched larvae being larger and more resistant to desiccation, and thus surviving longer on the sprayed apple to find an untreated point of entry.

Table 1.—Categories of species showing insecticide-resistant strains by 1960.

Group	Species		Order	Number
	Agricultural	Public Health		
Pre-DDT	11	2	Diptera	65
			Hemiptera	23
DDT	19	36	Acarina	17
			Lepidoptera	15
BHC-dieldrin	16	58	Coleoptera	7
			Thysanoptera	4
Organo-phosphorus	20	9	Siphonaptera	4
			Orthoptera	1
			Anoplura	1
Total[a]	65	72		137

[a] Less than the sum of the columns, since some species are resistant to 2 or 3 groups.

The total number of species with resistant strains has risen since 1945 to the appalling figure of 137. This period commenced with the development of resistance to DDT in the house fly, and the subsequent appearance of resistance to BHC, chlordane and dieldrin. Investigation of the cross-resistance pattern revealed that there were two separate types of resistance within the chlorinated hydrocarbons. Strains that had developed DDT-resistance under selection pressure from DDT remained susceptible to BHC and the cyclodiene-type insecticides aldrin, dieldrin, endrin, heptachlor, chlordane and toxaphene, but showed a cross-resistance to DDD, methoxychlor and Perthane®.[2] Strains that had acquired resistance under pressure from BHC or some cyclodiene insecticide had become resistant to all the other insecticides in that group, but remained susceptible to DDT and its relatives. This type of resistance to BHC and the cyclodiene group of chlorinated hydrocarbons will for convenience be called dieldrin-resistance. The separateness of DDT-resistance on the one hand and dieldrin-resistance on the other has been demonstrated not only in house flies, but also in mosquitoes, body lice, bed bugs, ticks, fleas and cockroaches; among the agricultural insects it has been shown for the cabbageworm, diamond-back moth, potato flea beetle, southern potato wireworm and boll weevil, and is probably of general application. Neither of these types of resistance to the chlorinated hydrocarbons carries a cross-resistance to the organophosphorus insecticides; but resistance to the OP group has been developed separately by many species of arthropods. So for all intents and purposes we have three main types of resistance—DDT-resistance, dieldrin-resistance and OP-resistance—with sporadic cases of resistance to other insecticide types.

A tabulation of these 137 species which have developed resistance (table 2) shows that they are about equally divided between plant-feeding insects and mites, and insects and ticks of public-health or veterinary importance. It also shows that dieldrin-resistance (with 74 species involved) is now more common than DDT-resistance (with 54 species), although the cyclodiene compounds have been in use for a shorter period of years and less extensively than DDT. The high hopes that the organophosphorus compounds would remedy these resistances have been progressively disappointed, and now OP-resistance is known in 28 species of insects and mites. Most of the resistant species are to be found in the Diptera, particularly the mosquitoes. Other orders involved are the Hemiptera (principally aphids, scales and leafhoppers), the Acarina (principally tetranychid mites), and the Lepidoptera (i.e. plant-feeding

Table 2—Resistance to insecticides to the pre-DDT era.[a]

Insect	Insecticide	Locality and Year
Aspidiotus perniciosus Comst. (San Jose scale)	Lime-sulphur	Wash. 08, Ill. 2
Saissetia oleae (Bern.) (Black scale)	HCN	California 1
Aonidiella aurantii (Mask.) (California red scale)	HCN	California 13
Coccus pseudomagnoliarum (Kuw.) (Citricola scale)	HCN	California 25
Carpocapsa pomonella (L.) (Codling moth)	Lead arsenate	Colo. 28, N.Y. 30, Wash. 31, Va. 32, S. Africa 40, Calif. 43, Syria 58
Boophilus microplus Canestrini (Cattle tick)	Sodium arsenite	Argentina 35, Queensland 37, Brazil, Colombia, Jamaica
Boophilus decoloratus Koch (Blue tick)	Sodium arsenite	Cape Prov. 38, Natal 45
Scirtothrips citri (Moulton) (Citrus thrips)	Tartar emetic	Calif. 39, Transvaal 45
Taeniothrips simplex (Mor.) (Gladiolus thrips)	Tartar emetic	California 43
Tetranychus bimaculatus Harvey (Two-spotted spider mite)	Selenium	Eastern U.S.A. 43
Rhagoletis completa Cresson (Walnut husk fly)	Cryolite	California 43
Anarsia lineatella Zeller (Peach twig borer)	Lead arsenate	California 44
Epilachna varivestris Muls. (Mexican bean beetle)	Rotenone	N.Y. 49, N. C. 51 Conn. 52

[2] Chemical names of proprietary compounds mentioned in this paper, for which no common names have been approved by the Entomological Society of America, are given in a list which precedes the "References Cited."

[a] In this and succeeding tables, the figure following the name of the state or country indicates the date of the report, e. g., Wash. 08 represents Washington, 1908.

Table 3.—Resistance to three insecticide groups by noxious Diptera.

Species	Group		
	DDT	*BHC-Dieldrin*	*Organophosphorus*
Musca domestica L.	Sweden, Denmark 46 U.S.A. Mediterr. 47 N.Z., S. America 48 W. Europe (4), Canada 49 USSR, Africa 50 Japan 53, China 56 Czech. Pol. 58, India 60	Calif. Sard. Egypt 49 U.S.A. Scandin. 50 S. America 51 Africa 52, USSR 53 Japan 54 (5), India 57	Denmark, Fla. 55 Switz. Italy, Ga. 56 N.J. 57 (6) Ariz. La. 58
Glyptotendipes paripes (Edwards)		Florida 53	Florida 55
Psychoda alternata Say	Illinois 49	England 53	
Culicoides furens Poey		Florida 58	
Leptocera hirtula (Rondani)	Malaya 55	Malaya 55	
Drosophila virilis[a] Sturt.	Japan 52		
Fannia canicularis (L.)	Spain 53		
Stomoxys calcitrans (L.)	Sweden 48, Norway 58		
Phaenicia cuprina (Wied.)		Australia 57 S. Africa 59	
Phaenicia sericata (Meig.)		New Zealand 59	
Chrysomyia putoria (Wied.)		Rep. Congo 49	Rep. Congo 54

[a] Also *D. melanogaster* Meig.; both field strains.

caterpillars). The following slides will rapidly review the cases of resistance in the world. A similar series was shown on this same screen at the meetings of the Eastern Branch of this Society in 1959; to those who will say "this is where I came in" one would point out that 15 new species have been added since last year.

Resistance to the two chlorinated hydrocarbon groups by the house fly is now virtually worldwide (table 3), papers having recently appeared describing their occurrence in eastern Europe (1)[3] and mainland China (2), and in India in the subspecies *M.d. nebulo* (3). Usually resistance to DDT developed after 2 years of its use, and resistance to BHC or dieldrin 1 year after their substitution.

Table 4.—Resistance of certain arthropods of public health or veterinary importance.

Species	*DDT group*	*BHC-Dieldrin Group*
Pediculus humanus humanus L.	Korea, Japan 51; Egypt, Levant 52; Iran, Turkey, Ethiopia, W. Africa, S. Africa (16), Peru, Chile 55 France 56 (17), Yugo. (18), Afghan. (19) 58 Mexico (20), Uganda (21) 59	France, Japan 55; W. Africa, S. Africa 56 Iran 57 (22), Tanganyika 59 (23)
Blattella germanica (L.)	France, Germany 58	Tex. 51, SE USA 55, NE USA 56 Calif. Panama (34), Cuba, Puerto Rico 58 (35), Canada (36) 59
Cimex lectularius L.	Hawaii 47; Ohio, Ill. Ind. Utah, Israel, Korea, Greece, 52; Japan, Italy 53; Colo. Pa. Tex. 55; Guinea 56; Hungary, Poland 59 (24)	Israel 56 (25), Fr. Guiana 59 (26)
C. hemipterus (Fabr.)	Taiwan 52; Hong Kong, Singapore 54; Bombay 55; Somalia, Tanganyika (27), Trinidad 57; Malaya 60 (29)	Bombay 56, Tanganyika 57 (30) Haute Volta 57, Dahomey 59 (31) Zanzibar 57 (32), Malaya 60 (29)
Pulex irritans L.	Peru 49, Ecuador 50, Greece 51; Brazil, Palestine 52	
Ctenocephalides canis (Curtis) and/or *C. felis* (Bouché)	Ga. 52; Fr. and Br. Guiana Colombia 53; Points in USA 56, Hawaii 58 (40)	USA 56, Hong Kong 57, Hawaii, Japan 58
Xenopsylla cheopis (Rothisch.)	W. India 59 (41), S. India 60 (42)	
Boophilus microplus	Queensland 54	Queensland 50, Brazil 52
Boophilus decoloratus	Cape Prov. (S. Africa) 56	Cape Prov. 48, Transvaal 52 N. Rhodesia 56 (45)
Dermacentor variabilis (Say)	Massachusetts 59	Massachusetts 59
Rhipicephalus sanguineus (Latr.)		N. J. 54; Panama, Tex. 58

Resistance to the organophosphorus compounds has generally taken some 5 years to develop, so that Diazinon®-resistant strains are now present in several European coun-

[3] See "References Cited" p. 15.

tries and malathion-resistance in several states of the U.S.A. (7, 8). Resistance of *Glyptotendipes* midge larvae developed first to BHC and then to EPN. The resistance of *Culicoides* sandfly larvae (9) developed under dieldrin pressure, but it was also shown to heptachlor. Resistance of the coprophilic *Chrysomyia* larvae (10) developed first to BHC and then in succession to Diazinon and malathion. Most serious is the recent development of resistance in the sheep blow flies of Australia (11), South Africa and New Zealand (12) to the dieldrin that was formerly so effective in breech treatments. The latrine fly *Fannia* and the stable fly *Stomoxys* have remained DDT susceptible in the U.S.A., but not so in northern Spain and Scandinavia (13), respectively. There are indications that the horn fly *Siphona irritans* is developing resistance to toxaphene in Texas (14).

DDT-resistance in body lice, first observed in Korea, is now known in many parts of the world (table 4); a moderate BHC-resistance and strong dieldrin-resistance is developing in certain regions. Both types of resistance are known in the bed bug, *C. lectularius*, fortunately in only a few isolated populations, but DDT-resistance and dieldrin-resistance are now common in the tropical bed bug, *C. hemipterus*. Resistance to chlordane by the German cockroach is becoming general in North America, with records from Central America and the Caribbean; two cases of DDT-resistance are known in Western Europe (33). Malathion-tolerant cockroaches have been produced in the laboratory (37, 38) but their existence in the field has not been conclusively proved; however, a strain definitely resistant to Diazinon has been discovered this year in Kentucky (39). Dog and cat fleas of the genus *Ctenocephalides* were early to show control failures with DDT or BHC, although the actual proof of resistance was usually lacking; much more serious is the recent appearance in India of DDT-resistance in the oriental rat flea, *Xenopsylla*, the principal vector of plague. The two species of *Boophilus*—the cattle tick of Australia and the blue tick of South Africa—showed remarkable parallelism in going BHC-resistant around 1950 and DDT-resistant around 1957. In the United States, resistance of the brown dog tick, *Rhipicephalus*, to chlordane and dieldrin is becoming widespread (43), while the wood tick, *Dermacentor variabilis*, has recently developed resistance to chlorinated hydrocarbons (44). Toxaphene-resistant goat lice (*Bovicola caprae* and *B. limbatus*) are indicated at Kerrville, Texas (14), and DDT-tolerant cattle lice (*Linognathus vituli*) at Beltsville, Maryland (15).

Many species of culicine mosquitoes have developed resistant strains (table 5). The tropical house mosquito, *Culex fatigans*, vector of filariasis, has responded to treatments in many parts of the world by becoming strongly dieldrin-resistant and much more DDT-tolerant than normal. The northern house mosquito, *C. pipiens*, does not yet show any widespread resistance. Other species of *Culex* in the tropics have become dieldrin-resistant, while in certain states *C. tarsalis*, the vector of western equine encephalitis, has developed DDT-resistant strains. Both *C. tarsalis* and *C. fatigans* have developed larval resistance to malathion. The principal problem in culicines concerns *Aedes aegypti*, the vector of yellow fever, in which DDT-resistant strains are now frequent throughout the Caribbean region, with one instance in Southeast Asia. In Puerto Rico this species has developed a dieldrin-resistance with an unusual cross-resistance to DDT. Dieldrin-resistance has also developed in larvae of two species of *Psorophora* rice-field mosquitoes. The salt-marsh mosquitoes were among the first to develope resistance in Florida, and the larger species *A. sollicitans* now shows it in Delaware. The irrigation-water mosquitoes of California also became resistant to chlorinated hydrocarbons some 10 years ago, and now *A. nigromaculis* has developed parathion-resistance.

Table 5.—Resistance to three insecticide groups by culicine mosquitoes.

Species	Group		
	DDT	*BHC-Dieldrin*	*Organophosphorus*
Culex fatigans Wied. (*quinquefasciatus* Say)	India 52, Reunion 53 Venezuela, Taiwan 56 Puerto Rico 57 (46) S. Austral. (47), Panama (48) 58 Hawaii (49), Rep. Congo (50) 59	Calif. 51, Malaya India 53, E. Asia 54 S. America 56 (51) W. Africa 57, Panama 58 (48) Zanzibar (52), Rep. Congo (53) 59	Cameroun 59 (53)
C. pipiens L.	Italy 47, Mass. N.J. 55 Israel, Japan, Calif. 59	Italy 50, Israel 55 France (54), Japan (55) 59	
C. tarsalis Coq.	Calif. 51, Oregon 56	California 51	California 56
C. coronator Dyar & Knab	Panama 58 (48)		
C. poicilipes (Theobald), *C. nebulosus* Theobald, *C. tritaeniorhynchus* Giles		Dahomey 59 (56)	
Aedes aegypti (L.)	Trinidad, Dominican Rep. 54 Venezuela 55, Haiti 56 (57) NE Colomb. 57 (58), S. Viet Nam 58 (59) Puerto Rico, Jamaica, Guadeloupe, French Guiana (60) 59	Puerto Rico 59 (61)	
A. sollicitans Walker	Fla. 47, Del. 51 (62)	Fla. 51, Del. 58 (63)	Florida 52[a]
A. taeniorhynchus Wied.	Florida 49	Florida 51, Ga. 59 (64)	Florida 52[a]
A. nigromaculis Ludlow	California 49	California 51	California 58
A. dorsalis Meig.	California 51	California 51	
A. detritus (Haliday)	France 59 (65)		
Psorophora confinnis Lynch-Arribalzaga, *P. discolor* Coquillet		Mississippi 54	

[a] Slight increase, of 4 to 10 times the normal LC_{50}.

It is in the anophelines that insecticide-resistance has become most serious (table 6), developed by the thorough house-spraying programs conducted for the eradication of malaria. Whereas in 1956 there were only five species that had developed resistance, by early 1960 no less than 28 anophelines were involved (66). Of these, 27 species showed dieldrin-resistance and only eight showed DDT-resistance, despite the fact that DDT had been in use for malaria operations since 1945 and dieldrin since 1955. Important vector species like *A. pseudopunctipennis* in Mexico, and *A. fluviatilis* and *A. culicifacies* in India, had never become DDT-resistant but developed dieldrin-resistance after one or two spray cycles. Dieldrin-resistance was first noted in *A. gambiae*, and now occurs throughout the West African range of this most serious malaria vector. The areas in which anophelines have developed resistance to the chlorinated hydrocarbons now comprise the homelands of nearly 10 per cent of the populations covered by the global malaria eradication programme. The situation is most hazardous where a powerful vector species has shown itself capable of developing both DDT-resistance and dieldrin-resistance, as in *A. stephensi* in the Middle East, *A. albimanus* in Central America, *A. sundaicus* in Indonesia and *A. sacharovi* in the eastern Mediterranean region.

Resistance in insects of public health importance, then, has come to involve 72 species, 58 showing dieldrin-resistance, 36 DDT-resistance, and 9 OP-resistance. The only genera of insect vectors of disease which have not yet developed resistance are the *Phlebotomus* sand flies, the *Triatoma* bugs, *Glossina* tsetse flies and *Simulium* black flies.

The widespread use of DDT in agriculture dates really

Table 6.—Resistance to DDT and dieldrin by anopheline mosquitoes.[a]

Species of *Anopheles*	Year and Locality
DDT	
sacharovi Favr.	1951, Greece (67), Lebanon, Turkey (68)
sundaicus Rdnw.	1954, Java, Burma
stephensi Liston	1955, Arabia, Iraq (69), Iran, S. India
subpictus Grassi	1956, North India, W. Pakistan (70), Nepal
albimanus Wied.	1958, Salvador, Nicaragua, Guatemala, Honduras
pharoensis Theo.	1959, Egypt, Sudan
annularis Wulp	1959, W. India
quadrimaculatus Say	1959, Georgia (71), Maryland (72), Mexico (73)
Dieldrin	
sacharovi	1952, Greece
quadrimaculatus	1953, Mississippi, Georgia, Mexico (73)
gambiae Giles	1955, Nigeria, Liberia, Ivory Coast, Dahomey, Upper Volta, Cameroun (74), Sierra Leone (75), Togo
subpictus	1957, Java, Ceylon, N. India (76)
coustani Lav. and *pulcherrimus* Theo.	1957, Arabia (77)
albimanus	1958, Salvador, Guatemala, Nicaragua, Honduras, Jamaica, Ecuador, Mexico, Br. Honduras, Cuba, Dominican Rep., Haiti
pseudopunctipennis Theo.	1958, Mexico (78), Nicaragua, Peru
aquasalis Curry	1958, Trinidad (79), Venezuela, Brazil
culicifacies Giles	1958, W. India, Nepal
vagus Don.	1958, Java, Philippines
barbirostris Wulp and *annularis*	1958, Java
sergenti Theo.	1958, Jordan
splendidus Koidz.	1958, N. India
fluviatilis James	1958, Arabia
stephensi	1959, Iran
punctimacula Dyar & Knab	1959, Ecuador
labranchiae (81) Fall.	1959, Morocco
minimus flavirostris (Ludlow) and *filipinae* Manalang	1959, Philippines
pharoensis	1959, Egypt (80), Sudan
albitarsis Lyn.-Arrib.	1959, Colombia, Venezuela
strodei Root and *triannulatus* (Neiva & Pinto)	1959, Venezuela
sundaicus Rdnw. and *aconitus* Don.	1960, Java

[a] Date given is first year of occurrence.

Table 7—Resistance of agricultural insects to DDT and DDD.

Species	Locality and Year
Pieris rapae (L.) (Imported cabbage worm)	Wis. 51, N. Y. 52, Fla. Conn. 53, Ill. 54, Japan 56, Australia 59 (82)
Trichoplusia ni (Hbn.) (Cabbage looper)	N. Y. 52, Cal. Ala. 54, Ont. Que. 56 (83, 84), La. Okla. Tex. 58 (85)
Protoparce quinquemaculata (Haw.) (Tomato hornworm)	Florida 51
Carpocapsa pomonella (L.) (Codling moth)	Ohio 51, N. Y. 52, Wash. 53, Ky. 55, S. Australia 55 (86), S. Africa 56, N.S.W. Cal. 57 (87), B.C. Ont. 58 (88), Victoria (82), Syria (89), 8 more States 59 (90)
Grapholitha molesta (Busck) (Oriental fruit moth)	Victoria 58 (82); Mich. Va. 59 (90)
Argyrotaenia velutinana (Walker) (Red-banded leaf roller)	N. Y. 54, Ont. 58 (91), Va. 59 (92) (DDD)
Tortrix postvittana Walk (Light brown apple moth)	Tasmania 58 (82) (DDD)
Plutella maculipennis (Curtis) (Diamondback moth)	Java 51
Laphygma exigua (Hübner) (Beet army worm)	California 58 (93)
Leptinotarsa decemlineata (Say) (Colorado potato beetle)	N. Y. 49, N. D. 52, Minn. 54 (94)
Epitrix cucumeris (Harris) (Potato flea beetle)	Ind. Conn. 51, Ohio 55, Va. 56, R. I., Wis. 57 (95)
Scolytus multistriatus (Marsh.) (Smaller elm bark beetle)	New England 51
Thrips tabaci Lind. (Onion thrips)	Texas 57 (96)
Diarthrothrips coffeae Williams (Coffee thrips)	Tanganyika 56
Lygus hesperus Knight (an alfalfa plant bug)	Wash. 52, Calif. 53, Ariz. 54
Erythroneura variabilis Beamer (Grape leafhopper)	Ariz. Calif. 51
E. elegantula Osborn (a grape leafhopper)	California 51
E. lawsoniana Baker (an apple leafhopper)	Kentucky 53
Typhlocyba pomaria McAtee (White apple leafhopper)	Eastern USA 59 (90)

from 1946, and the first cases of DDT-resistance appeared in the United States in 1951 and 1952 (table 7). The most important is the codling moth, in which DDT-resistance has subsequently appeared in virtually all the apple-growing regions of the world. Second in importance is DDT-resistance in the imported cabbageworm and cabbage looper, occurring also in Japan and parts of Australia in the former species. In the Colorado potato beetle the resistance is at present confined to three regions of the U.S.A. DDT-resistance in the potato flea beetle, however, has come to occur in many of the eastern States. Control problems in orchards have been aggravated by the development of resistance to DDD by the red-banded leaf roller in western New York and by the light brown apple moth in Tasmania; moreover, the oriental fruit moth is now showing DDT-resistant strains. Four species of leafhoppers, 2 species of thrips, 1 of plant bugs and 3 more caterpillars complete the list of DDT-resistant plant-feeders. Yet two other species of leafhopper, (the cotton jassid *Empoasca lybica* (97) and the garden leafhopper *E. solana* (98)) and three more species of *Lygus* (*elisus, desertus* and *lineolaris* (96)) are now suspected of having developed DDT-resistance. In view of the common practice of Dutch elm disease control, it is remarkable that the report of DDT-resistance in the smaller elm bark beetle has not been repeated since 1951.

With so large a volume of cyclodiene-type insecticides (table 8) being applied to cotton every year, it is not surprising to find that six species have become resistant to them in the U.S.A., and yet another in Israel. Resistance in the boll weevil is developed primarily against toxaphene, BHC, endrin, dieldrin and other cyclodienes, whereas its natural tolerance of DDT is little increased. The observed resistance of *Estigmene, Bucculatrix* and *Psallus* is to toxaphene-DDT mixtures, and the relative strengths of the cyclodiene-resistance and DDT-resistance have not yet been tested. The toxaphene-resistance of the cotton leafworm and the BHC-resistance of cotton aphid is definite enough. Resistance is also suspected in the bollworm (*Heliothis armigera*), but has not yet been confirmed. Most serious is the recent development of strong resistance to aldrin and dieldrin by the root maggots *Hylemyia antiqua, H. cilicrura* and *H. brassicae;* the barley fly, *H. arambourgi*, has recently shown control failures with aldrin in Kenya. Instances in 2 other dipterans, 3 other hemipterans and 1 kind of wireworm complete the list of dieldrin-resistant species in agriculture discovered to date.

Organophosphorus-resistance in plant-feeding arthropods is at present restricted to mites, aphids and psyllids (table 9). The OP-resistance of *Chromaphis* and *Therioaphis*

Table 9.—Resistance of foliage mites and aphids to organophosphorus compounds.

	Locality and Year
Tetranychus bimaculatus Harvey (Two-spotted spider mite)	Conn. J. J. Pa. N. Y. Calif. 49, S. Africa[a], Ont. (115) 57, S. Australia (116) 58[a] England 60[a]
T. urticae Koch	Germany 50, Norway 52 (117), France 54, Holland 55 (118), Israel 58 (90)
T. tumidus Banks (tumid spider mite)	Texas 52
T. mcdanieli McG. (spider mite on apples)	Wash. 52, Utah 58 (119)
T. atlanticus McGregor (strawberry spider mite)	California 56 (120)
T. pacificus McG. (Pacific spider mite)	Wash. (apple) 52, Calif. (cotton) 56 (120)
T. cinnabarinus Bois. (mite on field crops)	Arizona 58 (121)
Panonychus ulmi (Koch) (European red mite)	Wash. 50, N. Y. 7, B. C. 52, Calif. Miss. S. C. 57, Ont. (122) Holland (123) 58, Japan (90), Syria (89), Tasmania (82) 59, England 60
Panonychus citri (McG.) (Citrus red mite)	California 56 (90)
Vasates cornutus (Banks) (Peach silver mite)	Wash. Ore. 59
V. schlechtendali (Nalepa) (Apple rust mite)	British Columbia 52
Typhlodromus occidentalis Nesbitt (a predacious mite)	British Columbia 52
Myzus persicae (Sulzer) (Green peach aphid)	Wash. 53, Ore. Wis. 59 (96)
Chromaphis juglandicola (Kalt.) (Walnut aphid)	California 53
Myzus cerasi (F.), (Black cherry aphid), *Sappaphis pyri* (Fonsc.) & *S. plantaginis* (Passerini)	Switzerland 54
Therioaphis maculata (Buckton) (Spotted alfalfa aphid)	California 56 (124)
Psylla pyricola (Pear psylla)	NW USA, B.C. 59 (90, 113)

[a] Reported as *T. telarius*.

Table 8.—Resistance of agricultural insects to BHC and cyclodiene derivatives.

Species	Insecticide	Locality and Year
Anthonomus grandis Boh. (Boll weevil)	Toxaphene	La. 55, Tex. Ark. Miss. S.C. 57 (99), Okla. Ala., N.C. 59 (100)
Alabama argillacea (Hbn.) (Cotton leafworm)	Toxaphene	Tex. Venezuela 51, SE USA 59 (85, 101)
Estigmene acraea (Drury) (Salt-marsh caterpillar)	Chlor. Hydr.	Calif. 57, Ariz. 59 (102)
Bucculatrix thurberiella Busck (Cotton leaf perforator)	Chlor. Hydr.	California 58 (85, 101)
Psallus seriatus (Reuter) (Cotton fleahopper)	Chlor. Hydr.	SE USA 58 (85)
Aphis gossypii Glover (Cotton aphid)	BHC	SE USA 57
Earias insulana Boisduval (Spiny bollworm)	Endrin	Israel 56
Conoderus fallii Lane (Southern potato wireworm)	Chlordane	South Carolina 55
Psila rosae (Fabr.) (Carrot rust fly)	Dieldrin	Oregon 58 (103)
Hylemyia antiqua (Meigen) (Onion maggot)	Dieldrin	Wis. 57, Mich. (104) Ont. (105) Wash. Ore. (106) B.C. 58 (107), Ill, N.Y. 59 (96)
Hylemyia cilicrura (Rond.) (Seed-corn maggot)	Dieldrin	Ont. Conn. 60
Hylemyia brassicae (Bouché) (Cabbage maggot)	Dieldrin	Ill. Wis. (110) Wash. B.C. 60 (111)
Aeneolamia varia Fabr. (Sugar-cane froghopper)	BHC	Trinidad 57 (112)
Blissus leucopterus (Say) (Chinch bug)	BHC	Panama 58 (48)
Psylla pyricola Förster (Pear psylla)	Dieldrin	Washington 58 (113)
Liriomyza pusilla Meig. (Serpentine leaf miner)	Cyclodienes	Fla. 51 (114)

is quite widespread in California, while that of *Myzus* occurs in orchards in the Northwest and greenhouses in Wisconsin (96). The potato aphid, *Macrosiphum solanifolii*, was reported to have shown parathion-resistance in 1954 (125), and the serpentine leaf miner is suspected of having become parathion-resistant in Florida in 1957. There is evidence in 1960 of parathion-resistance in the rice stem borer (*Chilosimplex*) in Kagawa prefecture of southern Japan. In both *Therioaphis* (124) and *Myzus* (96), Phosdrin® and demeton have been found effective where parathion was ineffective.

Resistance of the European red mite to parathion and malathion is now present in almost all apple-growing regions of the world. Equally widespread is OP-resistance in greenhouses among mites variously termed *Tetranychus bimaculatus, T. telarius* and *T. urticae*. Other resistant tetranychids include two more species on apple, and yet others on cotton, citrus and field crops; the three remaining OP-resistant mites include one predacious species. The OP-resistance in general has proceeded from TEPP and parathion to malathion to demeton to Trithion®, finally involving all with possibly the exception of ethion (126). This OP-resistance does not extend to the chlorinated acaricides (127). However, resistance to ovex was developed by the two-spotted spider mite in 1953, and by the European red mite in California in 1954 and in Ontario and Nova Scotia in 1958 (128). Resistance to Chlorobenzilate® and chlorbenside was developed in 1954 by both species of mites in California. Resistance to Kelthane® was developed in 1954 by the two-spotted spider mite in eastern greenhouses, and by the European red mite in the Pacific Northwest in 1959. Resistance to Aramite®, a sulphur-containing acaricide, was developed by a strain of *T. bimaculatus* at Cincinnati in 1955 (129), but it has not yet appeared in the European red mite.

A total of 65 species of plant-feeding arthropods have thus developed resistant strains, 19 showing DDT-resistance, 16 dieldrin-resistance and 20 OP-resistance. Many species have survived heavy treatments of DDT for more than 13 years without developing resistance at all, the most remarkable being the European corn borer. Grasshoppers and locusts have not developed resistance to BHC or cyclodiene insecticides, even when experimentally selected with aldrin for five generations.

All the instances we have now reviewed, involving 137 species, are cases of physiological resistance, where populations have developed the capacity of surviving a dose that would normally prove lethal. There is another type, called behavioristic resistance, where a population has developed the ability of avoiding a lethal dose. In mosquitoes, this has been accomplished either by being stimulated to leave a residual deposit of DDT before a lethal dose has penetrated, or by avoiding the indoor resting places where DDT is normally applied. An example of the first is *Anopheles albimanus* in Panama, and examples of the second are *A. punctimacula* in Colombia and possibly *A. cruzii* in Brazil. Certain house fly populations in Georgia and Florida have developed the characteristic of avoiding malathion baits. Whether behavioral changes may occur in plant-feeding insects is uncertain; DDT-resistant potato flea beetles have been reported to feed more on treated leaves than the normal strains, but this may be simply a consequence of their DDT-resistance and not a behavioral phenomenon. The entire subject of behavioristic resistance in insects is sorely in need of quantitative study before it can be established as a reality.

One may well ask what proof exists in the cases of physiological resistance which we have reviewed. One criterion is that the population in question survives the treatment schedule which formerly controlled it and still controls neighboring populations. Another criterion is that a sample of the population taken into a formal test with the insecticide shows significantly higher survival than normal populations, i.e., either a laboratory colony or a sample from areas which had not been exposed to the control regime or alternatively are still controlled by it. Just how much difference is needed to justify the word "resistance" is a matter of judgment that is best finally derived from the experience in practice; a difference of lower order but still statistically significant is now usually termed "tolerance", which unfortunately often turns out to be resistance *in statu nascendi*. Of course it has now become customary to reserve the word resistance to cases where it had developed, and not apply it to species that are naturally tolerant of the insecticide, such as grasshoppers with DDT.

These formal tests are of great importance in discovering and characterizing resistance, and if standardized for species-wide or family-wide use can allow the susceptibility levels to be evaluated for resistance even if there is no normal strain available for comparison. Such a test has been developed for adult mosquitoes, and it has been standardized by WHO for world-wide use (130); in fact it is the reason we know so much about resistance in *Anopheles*. The basic toxicological principle is exposure for a unit time to graded concentration of the insecticide, so that a dosage-mortality regression line can be obtained; the suspect population can thus be compared with the normal on the basis of its LC_{50} level, and the result expressed as a resistance ratio. Graded concentrations of the insecticide dissolved in a refined mineral oil are impregnated into filter paper and the insects are exposed to it for 1 hour; their mortality is scored the following day after 24 hours in clean containers. Test kits containing papers already impregnated with standard concentrations of DDT or dieldrin are now distributed all over the world; these treated papers retain their effectiveness undiminished for at least 3 years, and may be used many times over with uniform results. This test kit with modifications is also used for *Phlebotomus* sand flies, bed bugs and *Xenopsylla* fleas. Resistance tests for mosquito and black fly larvae involve 24-hour exposure to graded concentrations of insecticide in the water. At present the tests used for house flies and cockroaches involve deposits from acetone solution on the walls of glass jars, and for cockroaches the results are based on the time of knockdown from a single concentration (131).

Tests for susceptibility or resistance in plant-feeding insects are much more difficult to set up and standardize. However, a certain pattern has already been set by those who have worked with particular species (93). For large insects that can be handled, such as the boll weevil, topical application of different amounts of the insecticide in oil solution is feasible. For chewing insects such as caterpillars and leaf beetles, samples of foliage (or of fruit surface) may be treated with graded concentrations of the insecticide in a xylene or acetone emulsion; this method is also applicable to mites and aphids already established on the foliage. For larger sucking insects, but which are still too small or delicate to allow topical application, it is best to coat shell-vials with graded concentrations of the insecticide in oil, and place the insects in them for a standard period (132). The impregnated papers and containers supplied by WHO have been found satisfactory to measure resistance in the adults of *Hylemyia* root maggots, and they may indeed prove to have a wider application in the agricultural field. Against the objection that such exposures are unnatural, it may be stressed that the object of these tests is to compare populations for their absolute susceptibility levels to given insecticides. The importance of tests for plant-feeding insects is fully realized by the new Entomological Society of America Committee on Promotion of Standard Test Methods, whose terms of reference evidently include also the standardization of tests for bioassaying amounts of insecticide using the insect as an assay tool. The susceptibility test on the other hand employs the insecticide as a tool to assay the susceptibility level of the insect. It may be used to assess the degree of cross-resistance to other insecticides, but it is not necessarily a means of evaluating different insecticides for their potential value in the field, which requires another type of test on more practical lines.

It is now time to turn to the fundamentals of the resistance problem and to enquire what physiological differences make one population resistant to an insecticide which is

lethal to its normal relatives. Since the resistance is inherited, it is also open to genetical study, and indeed the most revealing investigations are those in which biochemistry and genetics go hand in hand. Most studies have been concerned with the DDT-resistance of the house fly, —what it is which makes one fly resistant while another is susceptible. Reduced penetration of the poison through the integument was first suspected as the cause, but studies of many strains have shown resistance not to be consistently associated with a thicker tarsal cuticle or a less permeable integument. There was no consistent difference between resistant and susceptible strains in body size, speed of development or at any point in the bionomics. Initial comparison of a few resistant and susceptible strains indicated that the former contained more of the cellular oxidation enzymes such as cytochrome oxidase, or alternatively that their nervous systems were richer in cholinesterase; but as more strains were examined it became clear that there was no correlation of these enzyme contents with DDT-resistance. An alteration in habits was even suggested, since resistant flies were observed to stay near the ground and thus avoid sprayed surfaces; but this behaviour proved to be a consequence of resistance rather than its cause. Although some resistant strains have a higher lipoid content than normal, others do not; nor has any body chemical been found to be present in consistently abnormal concentration in all resistant strains. Whatever differences were observed, whether enzymic, chemical or morphological, proved to be associated with the geographical origin of the strain rather than its DDT-resistance.

However, one feature has been found to consistently characterize DDT-resistant house flies, and that is the ability to detoxify DDT by breaking it down to HCl and the nontoxic metabolite DDE. The conversion is accomplished by an enzyme, which has been extracted and purified, called DDT-dehydrochlorinase. This enzyme, which requires glutathione as an activator, can also detoxify methoxychlor and DDD. It is inhibited by DMC and piperonyl butoxide, and these compounds do in fact act as synergists for DDT against DDT-resistant flies. The detoxifying enzyme is abundant in cuticle and fat-body, where it would progressively destroy DDT as it penetrates, and as a final defense it is in high concentration in nervous tissue itself. That DDT-dehydrochlorinase is responsible for DDT-resistance in house flies is strongly indicated by genetical experiments; the DDT-resistance developed in the NAIDM (National Association of Insecticide and Disinfectant Manufacturers) strain and in wild populations in Illinois was found to be due to a single gene allele instead of many genes as formerly supposed; the homozygotes for this gene were found to contain much DDT-dehydrochlorinase, the heterozygotes half as much, and the susceptible homozygotes none at all (133). Under the influence of this gene, the house fly maggots synthesize the enzyme as they develop, and thus an additional feature is that those that develop more slowly synthesize somewhat more enzyme than those which pupate first; pupal life destroys about 50 per cent of the enzyme in all cases, so that the later emergent flies are more DDT-resistant than the earlier.

The gene for DDT-resistance in Italian flies has been called *kdr*, and is located in the same chromosome as the visible-mutant genes *bwb* (brown-body) and *dv* (divergent wings). The DDT-resistant gene in the Orlando-Beltsville strain is different but located in the same chromosome (134). A DDT-resistant gene found in the Y-chromosome of a strain at Canberra, and therefore only inherited in males (135), has almost certainly got there by translocation from the aforementioned chromosome.

Detoxification of DDT by the enzyme DDT-dehydrochlorinase has also been demonstrated in species that are normally DDT-tolerant, namely the Mexican bean beetle and the tobacco hornworm. High DDE production characterizes a strongly DDT-resistant strain of the mosquito, *Anopheles sacharovi* (136). In *A. sundaicus*, in which DDT-resistance segregates as if due to a single recessive gene, resistant homozygotes were demonstrated to produce much DDE *in vitro*, while a susceptible strain produced none. Again in *Culex fatigans* DDT-resistance appears to be of monofactorial origin (137, 138) and to be associated with increased DDE production not only by adults but also by larvae. The DDT-resistance of *Aedes aegypti* is also inherited as if due to a single factor, and larvae of resistant strains produce much DDE whereas susceptible ones produce very little. However, this may be an effect rather than a cause of the DDT-resistance, and attempts to isolate the DDT-dehydrochlorinase enzyme from this species have so far been unsuccessful. Rather the DDT-resistance of certain Caribbean strains appears to be associated with an increased secretion of peritrophic membrane causing an increased elimination of DDT from the alimentary canal.

In other species the picture may be quite different. The DDT-resistance of *Drosophila melanogaster* has been traced to a gene at map-distance 65 on chromosome 2, enhanced by another gene at locus 50 on chromosome 3. These same genes have been found in the corresponding positions in DDT-resistant *Drosophila virilis*. These vinegar flies excrete not DDE but the dichlorodiphenylethanol known as Kelthane; however, attempts to associate DDT-resistance of *Drosophila* with Kelthane production by genetical routines have so far been inconclusive (138a). In resistant body lice DDT is converted to a metabolite that is probably p-chlorobenzoic acid, by an enzyme that is not inactivated either by proteases or by boiling for half an hour.

The physiological mechanisms of resistance to the dieldrin group of insecticides remains as mysterious as their mode of action. Dieldrin-resistant house flies (139) and *Anopheles gambiae* (140) absorb dieldrin at much the same rate as normal strains, nor is there any difference in the rate of metabolism of dieldrin. Isolated nerves of dieldrin-resistant flies are significantly slower in being poisoned by dieldrin than normal flies. Dieldrin accumulates in the fat-body of American cockroaches; and *Anopheles maculipennis* mosquitoes become more dieldrin-tolerant if their fat-body is increased. House flies oxidize aldrin to dieldrin, isodrin to endrin, and heptachlor to heptachlor epoxide, but there is no difference between resistant and susceptible strains in the rates of oxidation. Heptachlor-resistant flies become more susceptible if their fat-body is reduced by starvation. These suggestive observations await some discovery that will fit them into a coherent picture.

Dieldrin-resistance is characteristically quite decisive, and can develop very fast. Although its inheritance has been found to be due to two or more genes in the house fly, in *Anopheles gambiae* it is inherited as a single gene allele. Dieldrin-resistance in the sheep blow fly, *Lucilia cuprina*, is also of monofactorial origin (141). Similar sharp segregation is shown with crosses involving dieldrin-resistant *Aedes aegypti*. There is evidence that the dieldrin-resistance of house flies may be enhanced by exposing the larvae to nonselective sublethal doses of dieldrin, a unique example of postadaptation in this field (142). Otherwise dieldrin-resistance has provided the perfect example of the preadaptive genetic nature of resistance; untouched populations of *Anopheles gambiae* in West Africa were found to contain already from 0.04% to 12% of individuals heterozygous for the dieldrin-resistant gene. Whereas treated populations came to contain, sometimes after one spraying, at least 90% resistant homozygotes.

Since there is a cross-resistance between BHC and dieldrin, it might be concluded that BHC-resistance results from the pleiotropism of the dieldrin-resistant gene, although the physiological mechanisms involved are different. BHC-resistant house flies absorb gamma-BHC less and metabolize it more than normal strains. The first metabolic product to be detected was pentachlorocyclohexene; although this is a dehydrochlorinated BHC, it has nothing to do with the enzyme DDT-dehydrochlorinase. Many more water-soluble metabolites are produced (143), the most important being dichlorothiophenols, and these appear when gamma-BHC and glutathione are added to fly homogenates. The observed increase in BHC-metabolism is considered insufficient to constitute the only

mechanism of resistant strains (144), particularly since their nerves can withstand the direct application of gamma-BHC crystals without showing toxic symptoms.

When the nature of OP-resistance in house flies was examined, it became evident that malathion-resistance is different from parathion-resistance. However the mechanisms of resistance are similar in entailing an increased detoxification of malaoxon and para-oxon, which are the effective anticholinesterase toxicants produced by biological oxidation of malathion and parathion. These resistant strains are characterized by an abnormally low content of aliesterase enzyme, which normally hydrolyzes aliphatic esters (145). Genetic experiments have shown malathion-resistance and parathion-resistance to be due to single genes in a multiple allelic series (146), and these same genes cause a reduction in aliesterase content (147). It has therefore been suggested that the function of these alleles is to convert the aliesterase, which is inhibited by being phosphorylated by malaoxon or para-oxon, into a phosphatase enzyme which rapidly dephosphorylates and hydrolyzes these molecules in the process (148). The malathion-resistance of *Culex tarsalis* mosquitoes, although inherited as a single gene, is not associated with reduced aliesterase and increased phosphatase, but rather with an increase in carboxyesterase activity and its metabolic products (149). Nothing is yet known of the mechanism of OP-resistance in tetranychid mites, but genetical studies have shown malathion-resistance in *T. bimaculatus* and *T. cinnabarinus*, and parathion-resistance in *T. pacificus*, to be inherited as if due to a single gene allele (150).

It is a strange thing that house flies and mosquitoes which have slowly developed a certain degree of malathion-resistance or parathion-resistance simultaneously acquire a very strong resistance to DDT (151), complete with a high DDT-dehydrochlorinase content. They have also a cross-resistance to Sevin®, a carbamate insecticide which although an anticholinesterase is metabolized in an entirely different way from the OP compounds. Selection of house flies with the carbamate insecticide S-17 has resulted in no carbamate-resistance but considerable OP-resistance and high DDT-resistance (152). Selection of house flies with the insecticide Dilan®, a mixture of the compounds prolan and bulan which cannot be dehydrochlorinated but are degraded to acidic metabolites, produces a strain with strong DDT-resistance and high DDT-dehydrochlorinase content. These little mysteries make life worth living for the student of resistance.

Pyrethrins are considered as not liable to resistance, and there is normally no cross-resistance to pyrethrins in DDT-resistant or dieldrin-resistant strains. But pyrethrin-resistance has developed in house flies near Stockholm, Sweden, in German cockroaches at Fort Rucker Alabama, and in the body louse at Marseilles, France. A high level of pyrethrin-tolerance associated with DDT-resistance has been reported in house flies from Italy, tropical bed bugs from Kenya (153), and blue ticks from South Africa (154). Moreover, two species of stored-product insects have recently developed strains resistant to pyrethrins, namely the tobacco moth, *Ephestia cautella*, in Georgia and Florida (155), and the granary weevil, *Sitophilus granarius*, in England (156).

Attempts to induce resistance in stored-product insects such as *S. granarius*, *Tribolium confusum* or *T. castaneum* by pressure from DDT, BHC, methyl bromide or HCN have so far produced nothing more than a slight increase in tolerance. It is remarkable that no further species beyond the three scale insects have developed HCN-resistance. In the California red scale the HCN-resistance was originally considered to be due to the response of closing the spiracles for some time, but recent experiments have found that the period of spiracular closure has no correlation with the resistance. Although it has been reported that HCN is metabolized to thiocyanates in *Gastrophilus* larvae, radioactive experiments with *Sitophilus granarius* show that the carbon of HCN ends up mainly as glycine. It has been confirmed that HCN-resistance in the red scale is inherited as a single gene without dominance located in the sex chromosome, for which the females are diploid and the males haploid.

Occasionally a resistance develops that is nonspecific and general to all insecticides; for example the resistance gene in *Drosophila* imparts tolerance to BHC, chlordane, parathion and DNOC as well as to DDT. Other strains of *Drosophila* have been made more tolerant than normal to a wide variety of insecticides by multiple genes, each of slight effect but adding up, located on all the chromosomes. The initial resistance in the famous Orlando strain of house flies in 1946 was nonspecific; moreover the flies were darker and more hardy. It has been frequently observed that insect strains put under any type of selection pressure, whether insecticidal or environmental, will develop greater tolerance to challenges from extremes or poisons. This has been called vigor tolerance, and it is responsible for the slight increase in tolerance usually noted between entirely separate resistance groups. The so-called "arsenic-resistance" of the codling moth is a good example of vigor tolerance, deriving solely from the greater vigor in the young larvae; its mode of inheritance indicates a polygenic origin. A more specific arsenic-resistance would derive from a significant increase in glutathione and other sulfhydryl compounds, as recently observed for the blue tick (157). Nonspecific vigor tolerance seldom increases to a point comparable to specific resistance. Thus when susceptibility tests reveal that a population has developed a significant increase in LC_{50}, it is important to ascertain whether this is vigor tolerance or incipient specific resistance. In the former case the dosage-mortality line moves slightly to the right without change in slope, indicating that the population as a whole is becoming slightly more tolerant. In the latter case the line becomes flatter or truncated at the top, indicating segregation for a strong resistance character or the existence of highly resistant types.

The accumulation of multiple genes may not only result in vigor tolerance, but also may allow the specific resistance gene to express itself, or may prevent the resistant genotypes from being at a disadvantage in the normal environment. It is probably these ancillary or satellite genes which are responsible for the observed fact that strains already made DDT-resistant become thereby quicker to develop BHC-resistance or malathion-resistance (158) subsequently. They also make a strain that has reverted to susceptibility, because application of the insecticide was discontinued, rapidly regain it when selection pressure is resumed. Reversion does occur in many cases, particularly when field strains are open to dilution by surrounding untreated populations; for example, it has happened with dieldrin-resistant *Anopheles culicifacies* in Bombay state on substitution of DDT (159), and DDT-resistant *A. sundaicus* in Northern Java on substitution of dieldrin. When OP compounds replaced DDT and chlordane for house fly control in Denmark in 1952, a progressive loss of DDT- and chlordane-resistance resulted; but when these insecticides were reapplied experimentally in 1955, the resistance returned in 6 weeks. House flies in Egypt regained in 7 weeks the resistance that it had taken them more than a year to lose.

It has often been suggested that an alternation or rotation of insecticides would be a means of avoiding or delaying the onset of resistance to any one of them. European red mites in Ohio orchards combatted with different acaricides in successive years, or in which OP compounds were alternated with sulfur-containing acaricides, failed to develop the OP-resistance found in other orchards in the State which had always been treated on straight OP spray schedule (160). It has also been suggested that BHC-DDT mixtures be used in the malaria eradication programme, the BHC to kill those individuals that are resistant to DDT, and vice versa (161). It would seem more likely that the survivors are those that carry both DDT-resistance and BHC-resistance, so that the result is two types of resistance rather than one. The cogency of such suggested countermeasures can be tested either on general principles or by actual experiment. Genetical computations for polyfac-

torial systems indicate that resistance to two insecticides develops faster when they are used together than when one is substituted after several successive applications of the other. This principle has been tested by selecting the German cockroach for 15 generations with malathion and chlordane; when these two insecticides were applied as mixtures or alternately, the resultant level of malathion-resistance and chlordane-resistance was almost as high as when either compound had been used alone, but now involved two instead of one (162). The investigators concluded that using these insecticides simultaneously or alternately was not the answer.

Rotations may be effective countermeasures in populations which have many annual generations and are exposed to genetic dilution, and where several chemical groups are available as in acaricides. But in most cases, as in the house fly, we have only three groups to play with, which can be blocked successively by DDT-resistance, dieldrin-resistance and OP-resistance. The carbamate Sevin is not effectively in a different resistance group from the OP compounds, and these in turn often have the effect of enhancing the other two resistances rather than diminishing them. It would appear that the soundest countermeasure would be to husband our resources, and not switch unnecessarily from one group to another and run the risk of going two strikes down instead of one. Meanwhile we can profit by a knowledge of the selection process, which operates when dosages are insufficient to cause complete control, or when residues decay to a selective level. Contamination of large areas with low levels of persistent insecticides like DDT or dieldrin is an unrivalled method of encouraging the development of resistance. Conversely, complete control in the target area alone, particularly when it is surrounded by a large untreated population, is the least likely inducement for resistance. Close guard should be kept against control failures, which not only are a disaster in themselves but serve to stabilize and intensify the developing resistance. The guard may be kept by periodically performing susceptibility tests, and switching to a different insecticide when, and not until, resistance to the standard insecticide is imminent. Again, we should not be too doctrinaire about this, and experiments should be made to find out whether a given species is amenable to rotations or mixtures, following the outcome with susceptibility tests.

Seven years ago it appeared hopeful that synergists could be found that would restore the potency of DDT for strains become DDT-resistant. DMC (Dimite®) was such a synergist, being an inhibitor of DDT-dehydrochlorinase, and the search still continues among other chlorinated and fluorinated hydrocarbons (163). But it proved that resistance subsequently appeared to DMC-DDT mixtures, all that was necessary being the development of more DDT-dehydrochlorinase to metabolize the competitive inhibitor DMC as well as the DDT. A search is also being made for compounds which will not induce resistance to themselves, e.g., Aramite for the European red mite; but we must remember our initial hopes that the OP compounds and the pyrethrins fell into this category. Now it seems that there is no insecticide which can select to which resistance cannot be developed by some arthropod somewhere. It isas if the genes which made them susceptible to these compounds must equally well have alleles which make them resistant to them. So however much we dodge around from one insecticide to another, we seem to be travelling down a one-way street.

There remains however the remote possibility of throwing resistance into reverse. If compounds can be found that are not merely just as toxic to resistant insects, but *more* toxic to resistant individuals than to normal ones, then we can select in reverse. For example, the organophosphorus compound DTP (a technical preparation of diisopropyl tetrachloroethylphosphate) was found at Beltsville to be more toxic to DDT-resistant house flies than to normal ones, and selection pressure at Urbana with DTP on a strain in which the greater part of the individuals were DDT-resistant produced a DDT-susceptible strain after three generations of pressure. This illustrates the principle, although similar results were not obtained with new strains and new preparations of DTP. Another compound, CBA (cetyl bromoacetate) showed this type of negative correlation with DDT in its cross-resistance characteristics when tested on certain house fly strains at Rome. But when tried out on field populations in Denmark it failed to show this negative correlation, and it may be that CBA merely acted more rapidly on the Roman strains without being actually more toxic. However CFA (cetyl fluoroacetate) now shows more promise. A compound having a negative correlation with DDT in the most definite sense has been discovered at Osaka, Japan; this is PTU (phenylthiourea). The gene allele at locus 65 on chromosome 2 that confers DDT-resistance in *Drosophila melanogaster* simultaneously confers enhanced PTU-susceptibility, while the normal allele that means DDT-susceptibility confers PTU-resistance. Thus all the DDT-resistant individuals are preferentially killed by PTU, and all the PTU-resistants are killed by DDT. A mixture of the two insecticides controls *Drosophila* without selecting in either direction. Unfortunately PTU is a very weak insecticide, but its p-chlorophenyl derivative is more toxic and still exhibits this negative correlation with DDT (164). Unfortunately also PTU has failed to show negative correlation with DDT in house flies (165). But obviously here is a very promising field of study, if only because the rewards are so great, for indeed the negatively correlated insecticides are the pot of gold at the end of the rainbow. The search requires only that resistant strains be added to the normal colonies used as test insects in insecticide screening.

Apart from the negatively correlated insecticides, there is no single answer to the resistance problem. Meanwhile we can only hold the line, making the most of the three or four major groups of synthetic insecticides now available, while the search proceeds for insecticides in new resistance groups. To the factors of low production cost, lack of toxic hazard, and action on a broad spectrum of insects, industry will now justifiably add nonliability to resistance as a prerequisite of a compound worthy of commercial development. Resistance has posed a tremendous challenge, and defies us that the golden age of insect control by chemicals is already passing. Facing up to this challenge requires all the biological knowledge and skill that entomologists can bring to bear. Fortunately the resistance problem has a compelling attraction because it involves both the biochemical and the genetic fundamentals of biology, besides being of such importance in human affairs. Already more than a thousand papers have been produced on insecticide-resistance, and the workers in the field belong to more than half the nations of the world. In this challenge of a common enemy we find the bonds of interests shared which bring us together as colleagues in a disciplined study of the phenomena of nature, of which John Henry Comstock was an early advocate, and which we feel sure he would approve.

Chemical Names of Compounds Mentioned in this Paper Which do not Bear Common Names.

Aramite = 2-(*p-tert*-butylphenoxy) isopropyl 2-chloroethyl sulfite
Chlorobenzilate = ethyl 4,4′-dichlorobenzilate
Diazinon = *O,O*-diethyl *O*-(2-isopropyl-6-methyl-4-pyrimidyl) thiophosphate
Dilan = 2-nitro 1,1-bis(*p*-chlorophenyl)propane and butane mixture (1–2 ratio)
Dimite = 1,1-bis(*p*-chlorophenyl)ethanol
Kelthane = 1,1-bis(*p*-chlorophenyl) 2,2,2-trichloroethanol
Perthane = 1,1-dichloro-2,2-bis(*p*-ethylphenyl)ethane
Phosdrin = 1-methoxycarbonyl-1-propen-2-yl dimethyl phosphate
Sevin = 1-naphthyl *N*-methylcarbamate
Trithion = S-(*p*-chlorophenylthio)methyl *O,O*-diethyl phosphorodithioate

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MOSQUITO CATALOG SUPPLEMENT

Order blanks for the six books published by the Thomas Say Foundation were sent to all members last summer. The newest of these books is A SYNOPTIC CATALOG OF THE MOSQUITOES OF THE WORLD by Alan Stone, Kenneth L. Knight, and Helle Starcke. This book appeared in 1959. Dr. Stone has prepared a supplement which will bring the CATALOG up to date with corrections and additions. The supplement will be published early in 1961 in the *Proceedings of the Entomological Society of Washington.* Partial printing costs are to be paid by the E.S.A. to obtain early publication. We will have copies with covers for sale. The price of the CATALOG is $7.25, a supplement copy will cost $1.00 and when the two are ordered together the price will be $8.00. These prices to members when personally purchased are or will be $6.50, 75 cents and $7.00.

The Place of Physiology in Entomological Curricula[1,2]

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My point of view on this subject is that the place for physiology, like that for anatomy, ecology, taxonomy and so forth is throughout the curriculum and throughout most of the courses in such a curriculum. Let me explain what I mean.

The courses listed in catalogues by zoology and botany departments originated in the 19th century with a few later additions such as genetics. Courses listed by entomological departments tended to follow the same pattern. In the 19th and early part of the 20th century these listings served satisfactorily. At that time there was little cross-over, for instance, between anatomy and physiology except for such gross things as lever action in skeletal movements. The "subjects" then recognized could and did develop pretty much independently. This point of view was not as yet too restrictive when I did my undergraduate work back in the late '20s. I came along just at the time when the University of Georgia was shifting from the old phylogenetic approach exemplified by Hegner's text to the principles approach exemplified at that time by Curtis & Guthrie's text which first appeared in 1927. Both of these approaches utilize "type examples" for study, but the older method uses "types" to illustrate the structural and functional properties of one group after another, the newer method utilizes "types" to illustrate principles.

According to the catalogue listings, advanced courses at the University of Minnesota and elsewhere are still largely organized on the old scheme of anatomy, histology, cytology, embryolog/, physiology, ecology, taxonomy and the like. But if one examines the *content* of these courses, one finds that they transgress and step on one another's toes almost daily. Formal segregation we still have but actual distinctness has largely ceased to exist. In a few cases such as Comparative Anatomy and Embryology of Vertebrates, each of which could be called prerequisite to the other, some departments have combined the courses. More commonly today college instructors present something related to the title used, "trangressing" as far as they wish into other titles. Such is indeed a solution and a workable one but everyone should realize it is happening.

And look at the men who are leaders—the big names of today. You will find that most of them do not stay within one of the old categories but study problems utilizing whatever approaches are most appropriate. Most entomologists probably think of Wigglesworth as a physiologist, I think of him as primarily a student of insect development with interests which lead him into doing things that could be called descriptive embryology, experimental embryology, endocrinology, ultrastructure, etc. Or think of Vincent Dethier, also called a physiologist, a student of behavior whose interests lead him into the cytology of sensilla, sensory reactions, physical chemistry of attractive molecules, the nature of the environmental effects, etc. Dietrich Schneider of the University of Munich is best known as an electrophysiologist studying sensory reactions of insects but he once told me that he felt forced into studying the structure and ultrastructure of moth antennae because he had too little chance of interpreting what he sees on his oscilloscope screen without intimate knowledge of the structure involved in the reactions. This complementariness of structure and function is even recognized by some leading biochemists. Thus, in the laboratory of the enzyme chemist Green at the University of Wisconsin the people are busy fractionating mitochondria and trying to unravel the spatial distribution of enzymes in cells because Green feels that not even the chemistry of oxidative cycles can be quantitatively elucidated without knowing the relevant anatomy (in this case at the ultrastructure level). Conversely, much of the work today of so-called cytologists is biochemical.

The above is not intended to belittle at all the persons who work on things that fall neatly into some one of the pigeonholes of the old scheme. Many taxonomists work quite satisfactorily using just the time-honored museum methods. And the eminent R. E. Snodgrass is a superb classical anatomist. I could name others. But, as the decades pass, more and more of the outstanding workers do not fit precisely into some one of the old pigeonholes because the tendency today is for people to study things such as phylogeny, population dynamics, behavior or metabolic cycles rather than anatomy, embryology or physiology.

The change to which I am referring began to show up in elementary textbooks for college zoology and biology earlier in this century. More recently it has begun to appear in some entomological textbooks. It is now beginning to appear in the revisions of highschool biology being developed under auspices of the A.I.B.S. Recognition of this reality by persons responsible for the organization of the N.S.F. a dozen years ago led to the subdivisions of biology within the N.S.F. being called "programs" and being labeled developmental, environmental, genetic, metabolic, molecular, psycho, regulatory, and systematic biology. In part, the avoidance of terms such as embryology, ecology and physiology was because of the relatively restricted mental image called to mind by these latter terms. To take one as example, "environmental biology" is not the same as ecology or autecology; it involves all the effects of and relations to environmental factors, and grants I know within this program could be classed as embryological, physiological or even anatomical. I suspect that a full list would show the full gamut of classical subdivisions within this one program (and at least most of the other programs).

Or take another approach. What does one find in textbooks of insect physiology? Processes and systems are discussed, and this involves giving anatomy, histology, cytology, much of ecology and embryology, including even some natural history. Conversely, Snodgrass' textbook on morphology includes much physiology to bring out the functional significance of the structures he discusses. Some may suggest that taxonomy is more distinct but serious students of speciation such as Dobzhansky and Patterson not only consider comparative anatomy, chromosomes and genes but also ecological niches and the sensory physiology related to food habits and reproductive behavior. The elementary course labeled Insect Physiology which I have taught at Minnesota for the past 15 years has been a lot of cellular physiology involving histology and cytology, relevant anatomy of the systems, some embryology, some biochemistry, some ecology, and a little "pure physiology" of insects. One needs to know all one can from all facets to tackle a problem whether it be in speciation or in excretion. Specialization at advanced levels, e.g. the content of a Ph.D. thesis, may be kept so restricted that it can be "pure physiology" or "pure" something else. But elementary courses, even if called "physiology," spill all over the map. So too do problems.

We are now revising our program at Minnesota (where entomology is primarily a specialty for graduate students). To state our thinking in a few sentences, our idea is to give

[1] Modified after a paper presented in the symposium on "The organization and teaching of entomology" at the 1961 Atlantic City meeting of the Entomological Society of America.

[2] Paper No. 1061, Miscellaneous Journal Series, Minnesota Agricultural Experiment Station, University of Minnesota, St. Paul 1, Minnesota.

an "elementary entomology" which is primarily a survey of the insect kingdom for undergraduates and for such other students as may still need this introduction when they reach us. Then we give an "advanced general entomology" covering three quarters. The first quarter will treat anatomy and morphology, the second quarter will treat development in the broad sense, and the third quarter will deal with maintenance and coordination. Beyond this there will be available more advanced courses which for the present will still have titles such as Systematics, Ecology, Physiology, Applied Physiology (=Toxicology), Biochemistry and Microbiology. And, of course, there are and I presume always will be specialized, non-basic courses such as Economic Entomology, Medical Entomology, Apiculture and others. The real basic course of the department, the Advanced General Entomology, it is hoped will be an adequate introduction, via the principle approach, to the various levels of anatomy, to embryology, to ecology, to physiology and even to systematics, since all of these facets are considered simultaneously while studying principles such as growth, maintenance of the internal environment, locomotion, sexual behavior and the like.

Taking a more detailed look at the agenda for these basic courses, we could outline them as follows:

Elementary Entomology:

A survey of the insect class with the necessary bit of anatomy plus slight touches on life histories, habitats and so forth.

Advanced General Entomology:

Part I (fall quarter): Anatomy and morphology. (1) The general overall organization of insects; (2) Principles and methods of comparative anatomy; interpretation of anatomical data; insect phylogeny. (3) The relations between gross anatomy and functions (especially locomotion and other bodily movements such as feeding.)

Part II (winter quarter): Development of insects. (1) Internal anatomy including endocrines, oenocytes, hemocytes and the like to clarify what has to be developed. (2) Reproduction including the development of germ cells, nutritional and ecological factors involved, copulation, and a bit on reproductive behavior. (3) Embryonic development including fertilization, description of developmental sequences, differentiation centers, organo- and histogenesis, special types of development (polyembryony, parthenogenesis and similar phenomena) and hatching. (4) Later development including growth rates, hormonal controls, regeneration, molting, metamorphosis, types of immature stages, rhythms, and diapause.

Part III (spring quarter): Maintenance and coordination. (1) Homeostasis including membrane structure, barriers and permeability, the properties of body fluids, circulation, salt and water balances, passive and active penetration, and the special organs evolved for regulation. (2) Metabolism including a consideration of the nature of food, digestion, the nature of enzyme action, the elements of intermediary cycles, respiration and energy, nutrition, excretion, secretion, and physiological ecology (e.g. temperature effects). (3) Coordination including the structure and properties of muscle and nerve, neuromuscular physiology, sensilla and sensory phenomena, bodily coordination, behavior.

In conclusion, one cannot divorce physiology from anatomy, embryology, ecology or even systematics and natural history. Physiologists today cannot do it and do not even try to do it. During the present century the content of courses has changed more than the titles of courses. Many of these course titles seem outmoded; they persist because the teachers do not pay much attention to the titles. Slowly—all academic changes are slow—I think courses will be reorganized around principles and problems currently active, and that course offerings will come to sound more like the program titles of the N.S.F.

Actually, the phenomenon of current organization being a heritage from the past is not limited to entomology or even to biology departments. The statements could be generalized to the university level as indeed has already been done in a different context by R. B. Gordon. He said (*Amer. Scientist*, 47: 375, 1959).

> "It may be that the rigidity of the departmental structure of universities, which often inhibits rather than encourages exchange of ideas between different scientific disciplines, puts the university scientist at a disadvantage when dealing with a new area of research which does not happen to fall entirely within the purview of an existing department."

At least, within a department we each know something of the problems of the various subfields. And we can, and many of us do, work in a number of the classical fields. To work on up-to-date problems calls for using all approaches that are likely to assist in elucidation of the problem. Few good anatomists, physiologists or ecologists are just that and nothing more—and no course should be considered up-to-date if it is just one of these.

REPRINT PRICE SCHEDULE

A price schedule for reprints of papers from the periodicals of the Entomological Society of America was adopted by the Governing Board at the 1955 meeting in Cincinnati. The schedule was printed on page 35 of the December 1955 BULLETIN OF THE ENTOMOLOGICAL SOCIETY OF AMERICA. This schedule has remained in effect until this writing in spite of the fact that the cost of the reprints to the Society was increased in 1957 and again in 1960. The Governing Board at the 1960 meeting in Atlantic City carefully considered the matter and voted to increase our prices. We hope it will be possible to maintain this new schedule as well as we did the previous one.

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Entomological Guideposts

F. E. Guyton[1]

Some Early Entomology and Entomologists

Entomology in its earliest aspects started in the United States over 100 years ago.

A young man by the name of Thaddeus W. Harris (1795–1856) was graduated from Harvard in 1815. He became an M.D. and practiced until 1831. It seems that somewhere in his early education he became interested in the study of insects and other aspects of natural history. Like the Swedish naturalist, Linneaus (1707–1778), who was educated and became famous in the field of medicine and then abandoned it for a professorship in natural history at the University of Upsala, and like Langstroth, who was educated as a minister but turned to beekeeping, Harris became essentially an entomologist. In 1831 he became librarian for Harvard. He was a lecturer on natural history subjects from 1837 and also had a private class in entomology. So it seems that Harris was the first teacher of entomology in the United States. As a librarian he prepared a catalog of insects; and as a member of a survey commission on geology and botany, he published a treatise on insects injurious to vegetation. His reputation as an entomologist rests upon this treatise.

The first professional entomologist in the United States was Dr. Asa Fitch. In 1854 for $1,000.00 a year he began to investigate the injurious insects of New York. He also was an M.D. He issued 14 annual reports for the State of New York on injurious insects and worked out detailed life histories of many of them. Fitch also became a teacher (Rensellaer Polytechnic Institute). I think perhaps he overemphasized the importance of insects at that time or underestimated the potential of the word mischief, for he said, "There is no kind of mischief going on in the world of nature around us but what some insect is at the bottom of it." His enthusiasm, dedication, hard work and writing greatly influenced the development of entomology in several states.

Now the government of the United States felt the need for an entomologist. Therefore, in 1854 it appointed Townend Glover (1813–1883) as the first federal entomologist. He worked for the Bureau of Agriculture which was then in the Patent Office. Glover was considered a competent individual with great foresight in his field. In 1862 the Department of Agriculture was created by President Abraham Lincoln. In 1863 Glover was transferred from the Patent Office to the new Department of Agriculture and here most of the federal entomology work has remained to this day.

Things began to happen rapidly now in the entomological world. The Morrill Act that established the land grant college system was passed in 1862 by Congress. Societies were formed and proceedings published. Magazines devoted to injurious insects and their control were published (1865, *The Practical Entomologist*, Illinois). A course, Insects Injurious to Vegetation, was taught at Kansas State Agricultural College in 1866. States began appointing state entomologists. Illinois in 1867 appointed B. D. Walsh, who was the first state entomologist. Missouri appointed C. V. Riley in 1868. The first funds were appropriated by Congress specifically for entomological research in 1872. Then followed such important historical land marks, as the Hatch Act, 1887, establishing state agricultural experiment stations and office of experiment stations to coordinate their work.

In 1854 there were only two professional entomologists in the United States. Townend Glover was entomologist for the United States Department of Agriculture and Asa Fitch was employed as entomologist for the state of New York. In 1881 there were three federal entomologists and several state entomologists. In 1909 there were 100 federal entomologists. Today it is estimated that there are less than 1,000 full time research entomologists in the various classifications and that there are probably 350 full time teachers of entomology in the various colleges and universities.

Kinds of Entomologists

Hobby Entomologist

The Hobby Entomologist might be defined as an entomologist who devotes part time to the study and collection of insects. He makes a living by some means other than entomology. He may be an amateur or a recognized entomological authority in some particular field.

The Teacher

The greatest activity in the teaching of entomology is found in institutions of higher learning—the universities and colleges. Here also is the Extension Entomologist, for surely he is a teacher. However, teaching of entomology is not confined to the university classroom. A number of our high school teachers have discovered the wonderful appeal insects have to students at high school level.

The college teacher's best excuse for existing is his students. He should inspire them not bore them; he should love them not hate them; he should lift and broaden their horizons not narrow or restrict them. He should not only encourage them to learn the subject matter of his course but he should try to help them be better in many areas, particularly courtesy, hygiene, appearance, grammar, industry, honesty and the like. He should strive to make them a product of which he will be proud because much of his compensation comes from his pride in their success. He should let them know early in a course that he is for them not against them. It is the teacher's duty to inspire his best students to do graduate work and to actually recruit them for his department. "Grants-in-aid" is normally a football term, but the competition between and among various departments for top graduates to whom they can give $1,800 to $2,000 a year stipends to do graduate work is about as keen and competitive as it is between institutions of the nation for top athletes. In my opinion it is becoming more difficult each year to recruit top students for graduate studies; therefore, more of us must participate in this activity.

Researcher

The researcher is an entomologist who is constantly looking beyond the horizon for unknown facts in this amazing insect world. There are folks who would intimate that this is the most important field in entomology. All normal individuals should quickly see that there can be no progress in an area without research but allow me to remind you that most good researchers are taught the fundamentals of their field and closely related fields before they engage in research. So it is through close relationship between the teacher and the researcher that we have the basis for progress and advancement in our great profession.

The Practical Entomologist

We hope that both the teacher and the researcher are practical entomologists. But we must add the pest control operator to this group. According to an article in the December, 1959, Bulletin of the Entomological Society of America page 217 it is estimated that there are 5,000 pest control firms operating in the United States with a personnel of 15,000 to 20,000 and an annual business of 225 million dollars. The author of the article states that he knows 175 of these pest control operators who are members of the Entomological Society of America.

[1] Chairman's Address, Southeastern Branch, E.S.A., Savannah, Georgia, Meeting, January 25–27, 1960.

It is our duty as entomologists to help this group, for they are posing before the public as entomologists. At Auburn University we are encouraging our graduates to enter this field. I would like to see the day when all the pest control operators are college graduates and entomologists. Furthermore I would like to see each state provide adequate laws that would particularly set a minimum educational requirement and other regulations that would aid this segment of our profession to attain a higher degree of respectability.

The Commercial Entomologist

An entomologist who works for a commercial enterprise of some type would be classified as a commercial entomologist. Many of our best trained and highest paid entomologists do research for chemical companies; others are public relations agents who make contact with organizations that will be influential in testing, approving and making recommendations for products of their companies.

It is somewhat difficult to classify the insecticide salesman. Certainly in most instances he has not been trained as an entomologist, yet he must in his work accumulate a great deal of information about the insects for which he recommends his materials.

The commercial entomological chemists, the top salesmen and the pest control operators without a doubt receive the highest remuneration of all entomologists. The incomes of top pest control operators now range from $20,000 to $100,000 or more annually.

Research

Let's examine entomological research a little more closely. At first thought we might imagine that our earliest entomologists, such as Fitch, Riley, Glover and others, had an open door in this field. Little or no research had been done in the United States. There were insect depredations on the principal crops, corn and wheat. There had been no entomological literature published in the United States. They knew little about chemicals. They had practically no materials or equipment with which to work. Early research necessarily turned to life histories of insects and in this area there was no scarcity of subjects.

In September, 1889, Vol. 1, No. 1 of the *Experiment Station Record* was published. Its purpose was to publish abstracts of published bulletins of the various experiment stations. Its last publication was in 1946. Reviewing some of these numbers, I found that in 1889, Alabama, California, Connecticut, Delaware, Illinois, and others, either had no insects, no insect problems, no experiment station entomologists, or no publications on insects from the experiment station. Arkansas had given directions for the use of kerosene as an insecticide and compiled a report on the tarnished plant bug by C. W. Woodworth.

Colorado published a 20-page report by James Cassidy, on insects, their depredations, seasonal appearance, and controls. A few of the mentioned pests were the squash bug, the codling moth, the imported cabbageworm, and the pea weevil. On these pests they used a total of four insecticides, which were London purple, Paris green, kerosene emulsion, and Ongarth's liquid tree protector. This last one I take to be a secret preparation by Mr. Ongarth.

Georgia printed notes on the pickle and melon worms and the Harlequin bug. Indiana reports mentioned several insects, the plum curculio being the most noted. From Massachusetts Fernald reported on the gypsy moth and suggested for control showering the trees with Paris green soon after the eggs hatched. From the U. S. Division of Entomology for 1889, Koebele published a 32-page report of his trip to Australia, and Riley in the same report tells of the success from the use of the vedalia for control of cottony-cushion scale.

Now let's inspect the entomological activities in 1920. Alabama reported 20–22 dollars profit per acre as a result of dusting for the boll weevil. Corn insect control work, sweetpotato weevil, pink bollworm, and cottonworm were mentioned. New Jersey workers stated, "Mosquitoes must go." Florida reported on Bordeaux oil emulsion and compared lead and calcium arsenate for boll weevil control. Many more pests had attracted attention by this time, such as the potato leafhopper, aphids, scales, the corn earworm, the European corn borer, cabbageworms, and the Japanese beetle. In 1946 the last *Experiment Station Record* was published. The abstracts in Volume 95, No. 1 of the report indicated a strong trend toward research on insecticides with DDT being the most often mentioned.

Entomological Society Programs

Let's examine some of the recent entomological programs to see if we can establish research trends. Leaving out symposia and invitational papers, I have tabulated all other papers under the headings non-insecticidal and insecticidal.

The joint meeting at Memphis in 1957 of the Entomological Society of America and the Cotton States Branch produced a total of 225 papers. One hundred and five (47.1 per cent) were of a non-insecticidal nature, while 120 (52.9 per cent) were on some phase of insecticides. At the joint meeting in December 1959 of the Entomological Society of America, the Entomological Society of Canada and the Entomological Society of Ontario at Detroit, a total of 265 papers were given. One hundred and sixty (60.3 per cent) were of a non-insecticidal nature, whereas 105 papers (39.7 per cent) pertained to insecticides. At the Cotton States Branch meeting in Memphis in 1959, 55 papers were presented, 21 (38 per cent) of which were on insecticides. At this Southeastern Branch meeting 77 papers will be presented, with 13 papers (16.8 per cent) on non-insecticidal subjects and 64 papers (83.2 per cent) insecticidal in nature. The average of the national meetings was 53 per cent on non-insecticidal subjects and 47 per cent pertained to insecticides, whereas our two Branch Meetings averaged 27.4 per cent non-insecticidal as against 72.6 per cent on subjects related to insecticides.

Some Entomological Provocatives

From the earliest history of entomology to the present, it is evident that entomologists have been insecticide conscious. Scattered along the way with this interest, they have worked on life histories, natural and biological control, ecologies, zoogeography, taxonomy, physiology and similar matter, but in their research, entomologists probably through necessity have given insecticides the lion's share of attention. In the past 12 to 15 years, it seems that a high percentage of entomological research has pertained to insecticides. Particularly does this show in the recent and present programs of our Branch. There is no question but what entomologists have approved great numbers of insecticides for use. Many of these compounds have been very good, at least for a time, in giving control of some of our worst pests. How much of the discovering of these insecticides can be credited to our experiment station or teaching entomologists? Have they merely been testers for commercial companies who originate the materials? Who is determining the trend of entomological research in experiment stations? Why is most of the research on insecticides? What have we accomplished in the last 20 years by the development of insecticides? What gains have we made in the last 30 years on the control of the boll weevil, the Mexican bean beetle, and others? Is it not the same old story year after year—buying insecticides and putting on insecticides? How would you compare the value of a research project that established a new insecticide to be applied year after year to the research project that ended in the eradication of the screw-worm in its eastern locale? Are there other secrets of permanent control hidden from the researcher or are we in an insecticide groove from which we neither have time nor desire to extricate ourselves? Do you believe that researchers have given biological control a fair amount of their time? Are you certain from a control standpoint that we would not be better off had we spent as much money and time on research on biological control as we have on research with insecticides? We might have had

our commercial insecticide companies producing insects and their salesmen selling as many different kinds of insects as there are insecticides today. On the Isle of Madagascar a law forbids the use of any insecticide within five miles of the commercial sugar cane district.

We should not be unmindful of biological control work that has already been done on such notable insects as the European corn borer, the cottony-cushion scale, and the Japanese beetle, but do you actually feel that our research entomologists are devoting enough time and effort to basic problems, revelations from which might open new approaches, new eras, new perspectives to our economic entomological dilemmas?

Do you believe that as entomologists we have our sights set high enough? Are we time after time aiming too low when we merely aim at annual control? Annual comes a number of times in an individuals life, but think how often it will come to those who follow us. Since 1929 we have eradicated the Mediterranean fruit fly from southern Florida twice. Do you believe that eradication where possible is economical? In the long run would it not be economical to eradicate the boll weevil, white-fringed beetles, the imported fire ant, and others? Why was the fire ant not eradicated by Alabama entomologists soon after its discovery? Why did not the Florida, Alabama and federal entomologists eradicate the white-fringed beetles at their discovery? Why have we all lived with the boll weevil for 60 years? Could the answer be that we simply are not eradication minded? Yes, we are turning out insecticides in great numbers, but are we really doing a complete job on those we turn out? Let's think for a moment about all or any one of the recommended insecticides for cotton pests, whether they be for the boll weevil, the bollworm, cotton aphids, or what have you. The general pattern and result for each insecticide is about the same. If it kills boll weevils it will kill the predators, the parasites, and the honey bees. If it kills the bollworm it will kill the predators, the parasites, and the honey bees, and so on, for practically all of our insecticides. Are we biting the hand that feeds us? Compare our insecticide research work for specific kills with the herbicide research work for distinct and separate species kill. Would you say conservatively we are far behind in the quality of insecticide research? When are we going to produce insecticides that will kill our enemies, protect our friends, and not be a menace to human beings and his domestic and wild animals?

In these remarks I have in no way intended to be critical. But I believe we have reached the plateau of progress upon which we must stop, listen, think, intraspect, reappraise, and plan anew for better results from our efforts.

MEETINGS

KANSAS CITY, MISSOURI. President Hotel, March 22–24, 1961. Annual meeting of the North Central Branch of the Entomological Society of America. D. M. DeLong, *Chairman*, Department of Zoology and Entomology, Ohio State University, Columbus 10, Ohio; Gordon E. Guyer, *Secretary-Treasurer*, Department of Entomology, Michigan State University, East Lansing, Michigan.

CINCINNATI, OHIO. University of Cincinnati, April 20–22, 1961. Annual meeting of the Ohio Academy of Science, Kenneth B. Hobbs, *Executive Secretary*, 505 King Ave., Columbus 1, Ohio.

SANTA BARBARA, CALIFORNIA. Miramar Hotel, June 19–22, 1961. Annual meeting of the Pacific Branch of the Entomological Society of America. C. H. York, *Chairman*, Shell Chemical Corp., 1008 West 6th Street, Los Angeles 54, California; H. H. Keifer, *Secretary-Treasurer*, 1112 Swanston Drive, Sacramento 14, California.

HONOLULU, HAWAII. University of Hawaii, August 21–September 6, 1961. Tenth Pacific Science Congress, Harold J. Coolidge, *Secretary-General*, Bishop Museum. Honolulu 17, Hawaii.

LAFAYETTE, INDIANA. Purdue University, August 27–31, 1961. Annual meeting of the American Institute of Biological Sciences. Hiden T. Cox, *Executive-Director*, A.I.B.S., 2000 P Street N.W., Washington 6, D. C.

QUEBEC, P.Q., CANADA. October 23–25, 1961. The annual meeting of the Entomological Society of Canada and of the Entomological Society of Quebec. A. P. Arnason, *President E.S.C.*, Research Branch, Canada Department of Agriculture, Ottawa, Ontario; E. C. Becker, *Treasurer E.S.C.* address as President; L. L. Reed, *Secretary E.S.C.*, Production and Marketing Branch, Canada Department of Agriculture, Ottawa, Ontario; L. Daviault, *President E.S.Q.*, Box 35, Sillery, P.Q.; P. Morisset, *Secretary-Treasurer E.S.Q.*, Quebec Department of Agriculture, Quebec, P.Q.

FOR FUTURE REFERENCE

WASHINGTON, D. C. August 21–27, 1963. The XVIth International Congress of Zoology. Gairdner Moment, *Secretary-General*, Goucher College, Towson, Maryland; C. W. Sabrosky, *Chairman of Arrangements Committee*, Division of Insects, U. S. National Museum, Washington 25, D. C.

LONDON, ENGLAND. August 1964. The XIIth International Congress of Entomology.

N.S.F. BASIC RESEARCH PROPOSALS

The Division of Biological and Medical Sciences of the National Science Foundation announces that the next closing date for receipt of basic research proposals in the Life Sciences is May 15, 1961. Proposals received prior to that date will be reviewed at the summer meetings of the Foundation's advisory panels and disposition will be made approximately four months following the closing date. Proposals received after the May 15, 1961 closing date will be reviewed following the fall closing date of September 15, 1961.

Inquiries should be addressed to the Biological and Medical Sciences Division, National Science Foundation, Washington 25, D. C.

MISCELLANEOUS PUBLICATIONS OF THE E.S.A.

As reported elsewhere in this issue the new Editor of the MISCELLANEOUS PUBLICATIONS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA is Captain Kenneth L. Knight, U. S. N., who replaces Dr. Jerome G. Rozen, Jr. The membership subscription rate is $6.00 per volume when paid from personal funds, which is less than the cost of certain numbers purchased singly. See the advertisements in the ANNALS and the JOURNAL.

INDEX XVII

The report of the *Committee on the Index to the Literature of American Economic Entomology* will be found elsewhere in this issue. The two year $26,300.00 National Science Foundation grant in connection with the INDEX is discussed by the Committee. The primary purpose of the grant is to permit the Society with added personnel and study to determine or at least explore where we are going or should go with the INDEX. You will note a number of changes and improvements in Volume XVII over XVI. Further changes are planned for INDEX XVIII. We are making a real effort to evolve the INDEX into a readily available, quickly usable and truly helpful tool for late twentieth century entomological research. Compiler Helene G. Cushman and Indexer Rebecca Wise are exerting their best efforts. They deserve the support of all professional entomologists.

Order blanks for INDEX XVII, which covers the literature for 1958, were sent to all members in mid 1960 and the book was printed at the end of the year. If you failed to order your copy we hope you will do so now. Possibly the library of your institution or company needs a complete set, Volumes I through XVII, of the INDEX. We have a dozen or so such sets on hand. After that Volume I will be out of print.

MINUTES OF THE OPENING SESSION, PRELIMINARY BUSINESS MEETING AND FINAL BUSINESS MEETING, ATLANTIC CITY MEETING—ENTOMOLOGICAL SOCIETY OF AMERICA

Atlantic City, N. J.—November 28–December 1, 1960

OPENING SESSION

November 28, 1960

The Atlantic City Meeting of the Entomological Society of America opened in the Vernon Room of the Chalfonte-Haddon Hall with about 600 members present. The overall meeting theme was the Contribution of Entomology to Human Welfare. President Jones introduced Director John O'Donnell, Commissioner of Revenue and Finance of Atlantic City, who represented Mayor Joseph Altman, to welcome the Society to Atlantic City. He presented President Jones with a key to the city and a Special Detective badge.

Preliminary announcements were made by Leland G. Merrill, *Chairman* of the *Local Arrangements Committee*, Ralph Sherman, *Chairman* of the *Program Committee*, Ray Kriner, *Chairman* of the *Photo Salon Committee*, and Executive Secretary R. H. Nelson.

In the absence of the President-Elect, President Jones asked *Program Committee Chairman* Ralph W. Sherman to take the chair. Mr. Sherman then introduced President Jones as follows:

> In the normal procedure, H. M. Harris would step forward briskly at this time and have the pleasure of introducing our President when he favors us with his presidential address. Regretfully, we learn that Dr. Harris is in New Delhi, India. To your *Program Chairman*, therefore, falls the unexpected but, nevertheless, pleasant duty of making this presentation.
>
> Our President is now following a tradition that has come to our Society from each of its progenitors—that of communicating to us a cogent message expressing his personal philosophy, his basic beliefs in his own professional field. He has been a pioneer in enhancing Federal participation in extension entomology. He has done much to advance our professional status and encourage the study of entomology among our youth. And he speaks from a wealth of rich experience.
>
> Addressing us, then, on his chosen topic, "Selling Insect Control," we recall to the rostrum the 1960 President of the Entomological Society of America—M. P. Jones.

The President's address, which is to be published in the BULLETIN, was well received. Mr. Sherman declared a 10-minute recess.

President Jones again called the meeting to order at 10:05 a.m.

Further announcements were made by Executive Secretary Nelson and B. B. Pepper, *Chairman* of the *Publicity Committee*.

The President then invited Dr. Cornelius B. Philip, *Chairman* of the *Memorial Lecture Committee*, to introduce Dr. A. W. A. Brown, Department of Zoology, The University of Western Ontario, London, Canada, who had been chosen to deliver the annual memorial lecture, which was in honor of John Henry Comstock. Dr. Philip remarked on the world wide recognition of Dr. Brown as an insecticide authority and upon his committee's great satisfaction at being able to persuade Dr. Brown to give the lecture in honor of Professor Comstock. Dr. Philip paid tribute to the Bioferm Corporation, a Society Sustaining Associate, for providing the Memorial Lecture Honorarium.

The lecture was entitled, "*The Challenge of Insecticide Resistance.*" This scholarly discourse is to be printed in the BULLETIN.

President Jones commented upon the comprehensive and enlightening remarks of Dr. Brown and complimented him upon his most timely address. President Jones then noted the end of the Opening Session of the 1960 annual meeting.

PRELIMINARY BUSINESS MEETING

November 28, 1960

The preliminary business session was called to order by President M. P. Jones at 11:15 a.m. He stated that, normally, the report of the Executive Secretary is the first item of business. However, another matter had arisen, which took precedence in 1960.

1. PRESIDENT'S REPORT ON THE PRESIDENT-ELECT

Since H. M. Harris was installed as President-Elect of the Society at the Detroit meeting, he had found it expedient to accept a position with the Ford Foundation in India. Under date of November 16, 1960, he informed your President that it would be impossible for him to attend the Atlantic City meeting and difficult to conduct the affairs of the Society in a normal manner. After due consideration and lenthy discussion, the Governing Board decided to accept his offer to resign as President-Elect of the Society.

The Board then proceeded to fill the vacancy of President-Elect by the method explicitly given in the Constitution, which is as follows: "A vacancy in the office of the President-Elect shall be filled as soon as practicable by written ballot by the Governing Board from the three eligible nominees in the most recent election, who received the highest number of votes."

In accord with this provision of the Constitution, the Board elected F. S. Arant to the office of President-Elect. He will take office immediately and shall assume the office of President at the close of this annual meeting.

2. REPORT OF THE EXECUTIVE SECRETARY

a. Finances. The Auditor's Report was noted and its publication in the March BULLETIN mentioned. Summary figures of interest, as follows, were presented.

General Fund—Gain during the year.....**$889.12**
It should be noted that $3,276.81 of the Disbursements was a loan to the Thomas Say Foundation.

Permanent Fund—Interest increment during the year.....**313.73**

Thomas Say Foundation—Interest and sales during the year.....**2,575.85**
Most of the sales income was for the new Volume 6 of the Foundation.

b. Membership. The total membership was reported as nearing 4,400. A summary covering 5 years was discussed.

The following tabulation shows the steady growth of the Society over the past five year period:

	Number of members as of September				
Class	1956	1957	1958	1959	1960
Active	3343	3627	3747	3807	3839
Emeritus	49	58	66	73	87
Honorary	9	9	10	12	14
Life	68	68	68	66	65
Student	278	327	303	351	375
Total	3747	4089	4194	4309	4380
Net Gain		342	105	115	71

c. Periodicals. The reports of the Managing Editor and the various Editorial Boards were mentioned and their study when printed in the March BULLETIN was recommended.

d. Index to the Literature of American Economic Entomology. The steady sales of INDEX XVI were mentioned as was the fact that the INDEX account continued in the red. The report of the *Index Committee* was mentioned. The Society obtained a National Science Foundation Grant of $26,300.00 for a two year study on the INDEX to try to make it more widely acceptable, salable, and self supporting. The entire matter will be given critical review at the end of the grant period in 1962. The probable appearance of INDEX XVII at the end of 1960 was announced. The members were asked to note the changes in format and were requested to send comments to the *Index Committee.*

e. Annual Review of Entomology. Our contract with Annual Reviews Inc. expired this year. This Society has made an important contribution to entomological literature in underwriting this new venture. Our financial picture for the five years of the contract is summarized below:

Fiscal Year	Receipts	Disbursements
1956	$6,163.25	$4,825.55
1957	7,230.10	8,172.99
1958	6,155.65	7,404.31
1959	6,503.15	7,805.22
1960	7,432.15	8,338.55
Totals	$33,484.30	$36,546.62

The total disbursements include $9,970.80 paid as a subsidy under the contract to get the REVIEW under way. We agreed to pay up to $10,000.00 (in four installments) over the 5-year period.

Beginning this year our ANNUAL REVIEW disbursements will be for the cost of books only.

f. Miscellaneous Publications of the Entomological Society of America. Volume 1 of this new venture was completed and Volume 2 started during the past year. With an income of nearly $4,000.00 and costs of about $6,000.00, the launching year shows a loss of only about $2,000.00. Sales of Volume 1, Number 1, and prepublication orders for Volume 2, Number 1 accounted for much of the income. Both numbers were concerned with insecticide resistance symposia. Dr. Jerome G. Rozen has resigned as Editor.

g. Bulletin of the Entomological Society of America. Publication of the 1960 revision of *"Commercial and Experimental Organic Insecticides"* by Eugene E. Kenaga in the June 1960 issue and the proposed publication of an up to date *"List of Common Names of Insects"* in the December 1960 issue were mentioned. It was noted that these publications were or would be available for general distribution.

h. Election Results. Election results were announced as follows:

ROBERT GLEN—1961 President-Elect and 1962 President.

W. J. BROWN—Section A Representative on the Governing Board 1961–1963 to replace E. G. Linsley.

R. L. BEARD—Section B Representative on the Governing Board 1961–1963 to replace Morris Rockstein.

It should be noted that the North Central Branch elected R. H. Davidson as their Representative on the Governing Board 1961–1963 to replace J. E. Bussart.

In other voting, Prof. E. I. McDaniel was elected to Honorary membership, and the new Section XII of the Constitution was carried by a large majority.

3. REPORT OF THE PRESIDENT

In his report, President Jones outlined briefly the more important matters that transpired during his administration.

a. Board meetings. Your Governing Board convened at 8:45 a.m., Saturday, November 26, and adjourned the next day at 4:30 p.m., November 27. During the two days and one night the Board considered the *Report of the Executive Secretary* and approved a budget for 1961 in the amount of $166,000.00. In addition to special items the Board considered 41 reports as follows:

10 Standing Committees
8 Society Publications, Managing Editor, and Editorial Boards
12 Special Committees
11 Representatives of the Society

b. E. S. A. Home. Since the last annual meeting, our Executive Secretary and his staff have moved into our new headquarters in College Park, Md. They appear to be comfortably located. All of us should feel proud of having our own ESA home. More visitors registered there in ten months than registered in Washington in five years. If you haven't seen it—better stop by sometime.

c. Meeting Places. The Board selected Philadelphia for the 1964 meeting. The meeting places for the next four years are therefore as follows:

1961 Meeting: November 27–30, McAllister Hotel, Miami, Florida
1962 Meeting: December 3–6, Hotel Westward Ho, Phoenix, Arizona
1963 Meeting: December 2–5, Sheraton Jefferson Hotel, St. Louis, Missouri
1964 Meeting: November 30–December 3, Benjamin Franklin Hotel, Philadelphia, Pennsylvania

d. The Southeastern Branch plans to move its 1962 meeting forward a couple of months, in order to meet with the parent society in Miami in 1961.

e. The Florida Entomological Society applied for affiliate membership and was accepted by the Governing Board. They, too, will meet with ESA next year.

f. Constitution. Article XII of the Constitution that caused so much confusion a few years ago has now been changed and approved by the membership.

g. Special Grants—the Society has received $62,600 in grants and the breakdown is as follows:

$26,000 for two years study on the Index to the Literature of American Economic Entomology
4,100 to bring foreign speakers to annual meetings
32,500 to send members to the XIth International Congress. This was granted as follows:
$22,500 National Science Foundation
10,000 National Institutes of Health

There were 142 applications for Congress grants, and 41 were awarded.

h. Miscellaneous. We are working on an application for a grant to make an overall study of entomology as proposed by the *Public Relations Committee* last year, page 43, March 1960 BULLETIN. The AIBS was not sending its BULLETIN to overseas members when ESA became an affiliate. Consequently, our Executive Secretary held back the $1.00 foreign membership dues. This year AIBS decided to send its BULLETIN to all members so ESA is paying AIBS several hundred dollars as dues of foreign members.

Your President, on invitation, appointed two delegates to the International Society of Bioclimatology and Biometeorology in London, England, September 4–10, 1960, and one delegate to the Third Conference on Agricultural Meteorology in Kansas City, Missouri, May 18 and 19.

Time will not permit reports of all Board actions, but they will appear in the March 1961 issue of the BULLETIN.

There is, however, one other in which members will be especially interested.

i. Proposed Standing Committee. The Governing Board recommends to the Society that the name of the *Committee on Public Relations* be changed to the *Committee on Public Information*, and that it be a Standing Committee of five members, representing research, teaching-extension, regulatory-control, industry, and informational aspects of entomology.

In accordance with the provision of the Constitution this proposal will be submitted to the members for action in the final business session.

4. OTHER BUSINESS

The President called for business or comment from the floor.

T. A. Brindley inquired regarding representation of the Society in conferences with the American Society of Agricultural Engineers on granulated insecticides. President Jones stated that this matter was discussed by the Board and a representative would be appointed by the 1961 President. Dr. Brindley also asked regarding a telegram of regret to Dr. H. M. Harris. President Jones advised that a cablegram was sent on November 26.

I. J. Becnel announced that the 1961 meeting of the Southeastern Branch would be held as usual but that the 1962 meeting would be moved up and held with the parent Society in Miami.

George F. Ludvik and Roy F. Barker questioned whether the Society membership list was being sold for mailing purposes as they were receiving what they called "trash mail". The Executive Secretary replied that the December BULLETIN containing the membership list was sold and that in addition envelopes were addressed for publishers of entomological books and for organizations such as Biological Abstracts. He noted that such material did not appear to warrant the designation of "trash mail". Glen L. Carman suggested that the Society approve the present policy of the Executive Secretary in handling the membership list and further suggested that anyone who doesn't like what comes in the mail can file it in the waste basket. There was general agreement.

R. D. O'Brien asked if a special member's price on the ANNUAL REVIEW OF ENTOMOLOGY were possible. The Executive Secretary stated that our understanding with Annual Reviews, Inc., was to maintain the advertised price.

5. RECESS

President Jones called for further business. There was none and the meeting adjourned at 11:48 a.m. to reconvene at 4:00 p.m. on November 30.

FINAL BUSINESS MEETING

November 30, 1960

The meeting was called to order at 4:00 p.m. by President Jones. The attendance at the final business meeting was estimated at over 400.

1. OLD BUSINESS

President Jones referred briefly to his report at the Preliminary Business Meeting at which time he reviewed the more important items of interest to Society members that had occurred during his administration and during the Governing Board meeting at Atlantic City.

2. NEW BUSINESS

The chair called upon the Executive Secretary to discuss various actions of the Governing Board.

a. Emeritus Members. The Executive Secretary read the list of 22 active members of long membership who had retired and requested emeritus status. These requests had been favorably acted upon by the Governing Board and the approved list follows:

WILLIAM A. BAKER	FREDERICK P. KEEN
HAZEL E. BRANCH	MERTON C. LANE
W. H. BRITTAIN	SIMON MARCOVITCH
RALPH V. CHAMBERLIN	HARRY L. PARKER
C. H. CURRAN	JOHN R. PARKER
J. R. DOUGLASS	ED M. SEARLS
E. W. DUNNAM	HARRY C. SEVERIN
ALBERT M. FOSTER	THOMAS B. SYMONS
ROBERT C. GAINES	FRANK L. THOMAS
GEORGE E. R. HERVEY	H. H. WALKDEN
J. D. IVES	R. W. WELLS

b. Membership Applicants. The *Membership Committee* reported 381 new member applicants to the Board and these were approved. A roster of the 214 active and 167 student applicants was exhibited and its availability to any interested member was noted.

c. Honorary Membership. The Executive Secretary announced that with the election of Prof. E. I. McDaniel to Honorary Membership, the Constitutional limit of 15 had been reached.

d. Budget. A budget of $166,000.00 covering estimated receipts and expenditures for the fiscal year 1961 was adopted by the Governing Board.

e. New Standing Committee. Reference was made to the recommendation of the Governing Board which was presented and fully explained at the Preliminary Business Meeting. In accordance with Article X, Section 1 of the Constitution, the recommendation was presented to the members for action. It is as follows: The Governing Board recommends to the Society that the name of the *Committee on Public Relations* be changed to the *Committee on Public Information* and that it be made a Standing Committee consisting of five members representing research, teaching-extension, regulatory-control, industry and informational aspects of entomology. It was moved by W. E. Bickley that the recommendation of the Board be adopted. The move was seconded by C. B. Philip. The chair called for discussion. There was none. The chair then called for the vote which was unanimous in favor of the motion.

f. Standing Committee Members. In accordance with Article VI, Section 2 of the By-Laws the Governing Board presents nominations for vacancies on the various standing committees. Nominations can also be made from the floor. The cited Section of the By-Laws provides that the Governing Board shall designate the Chairman of each Committee. The Board nominations for Committee members were read by the Executive Secretary. The Chairmen designated by the Board were also read for each Committee.

Program Committee. Member, Glen E. Carman. *Chairman*, D. O. Wolfenbarger.

Membership Committee. Members, George H. Blake, Jr. and Loyd L. Stitt. *Chairman*, James McD. Grayson.

Committee on Entomological Nomenclature. Members Richard M. Bohart, D. Elmo Hardy, C. B. Philip. *Chairman*, C. W. Sabrosky.

Committee on Common Names of Insects. Members, Walter Ebeling and John H. Lilly. *Chairman*, J. L. Laffoon.

Committee on Insecticide Terminology. Members, Henry Hurtig and Samuel C. Billings. *Chairman*, C. N. Smith.

Committee on Insecticide Reference Standards. Member, James G. Sternburg. *Chairman*, Lynn H. Dawsey.

Committee on Insect Surveys and Losses. Members, Leo G. K. Iverson and Wm. A. Simanton. *Chairman*, James N. Roney. Members *ex officio*, Richard T. Holway and William H. Anderson.

Committee on Finance. Member, George L. Hutton. *Chairman*, John V. Osmun.

Committee on Professional Training, Standards and Status. Members, William G. Eden and Paul O. Ritcher. *Chairman*, Ralph E. Heal.

Committee on Memorial Lectures. Member, D. O. Wolfenbarger. *Chairman,* B. N. Smallman.

Committee on Public Information. Members, Bailey B. Pepper (1961), Harold Gunderson (1962), Roy G. Richmond (1963), M. R. Budd (1964). *Chairman,* David G. Hall (1965).

The President called for nominations from the floor for committee membership. D. O. Wolfenbarger moved that the Secretary cast an unanimous ballot for the Board nominees. This was seconded by E. F. Knipling and was carried by voice vote.

g. Memorial Lecture. It was announced that the 1961 Memorial Lecture would be in honor of Thomas Say and in 1962 in honor of S. A. Forbes.

h. Attendance. Registration at the Atlantic City meeting was 859. Only the joint meeting with the Canadian Societies exceeded this.

i. Science Talent Contests. The Board adopted a resolution from the Pacific Branch as follows:

WHEREAS various professional disciplines are recognizing the merit of promotion of interest in pertinent science activities of National competitive programs at the secondary school level at State and National Talent Research Contests, Science Fairs, 4-H Programs, and the like, and

WHEREAS some outstanding exhibits with an entomological theme are often provided at such functions, for example, an ingenuous study of an ant community won the Boys Division of the Montana State Science Fair award in 1958, and

WHEREAS such organizations as the Committee on Education of the Society of American Bacteriologists are awarding certificates of merit to winners of high school exhibits in their discipline, and

WHEREAS ESA has been recognizing meritorious work among the national 4-H-Clubs,

BE IT RESOLVED that the Governing Board of ESA, through the appropriate Committee, promote similar expanded recognition through respective Branches of seeking out suitable high school candidates for an award of a certificate of merit in entomology for appropriate exhibits or activities.

j. Executive Secretary's Thanks. The Executive Secretary noted that he has an annual opportunity to express publicly his thanks to all who contributed to the running of a successful meeting. He stated that he especially wished to thank President Jones, Managing Editor Poos, the Governing Board members and the Society employees who carry the load in College Park and Washington.

k. Report of the Resolutions Committee. President Jones then called upon *Chairman* John H. Lilly of the *Resolutions Committee. Chairman* Lilly read the first seven resolutions as a group.

Resolution No. 1. WHEREAS, during the past year our Society has lost the contributions and friendship of thirty-one members by death,

BE IT RESOLVED, that this Society, which through its Executive Secretary has extended sympathy to the families of the deceased, further show its respect by a reading of the roll:

Alfred B. Baird (Emeritus)
H. G. Barber (Emeritus)
Eugene F. Bashor
Donald J. Caffrey (Emeritus)
Santiago R. Capco
Edwin C. Clark
George A. Edwards
Stanley B. Freeborn
A. B. Gahan (Emeritus)
C. C. Hamilton
Orville W. Hancock
Karl Hassler
R. W. Hutton
M. T. Joseph
William Kauffman
Walter M. Kulash
William M. Mann (Life)
Warren Moore
A. E. Poulsen
Alice V. Renk
W. B. Saunders
Herbert F. Schwarz
Wendell F. Sellers
John D. Sherman, Jr
Doyle B. Starcher
Louis A. Stearns (Emeritus)
Lawrence G. Strom
Herman Thoeni
Emilio Viale
Claude Wakeland (Emeritus)
William W. Yates (Emeritus)

The members were asked to stand for a moment of silence.

Resolution No. 2. WHEREAS, the various Chairmen and members of their committees, all of whom are recognized on page 120 of the program, have done outstanding jobs of planning for and conducting this meeting,

BE IT RESOLVED, that the Entomological Society of America express its thanks to the chairmen and members of the Program Committee, Committee on Local Arrangements, Ladies Entertainment Committee, Exhibits Committee, Photographic Salon Committee and Publicity Committee.

Resolution No. 3. WHEREAS, the success of this National Meeting has been enhanced by the skill and devotion to duty of the graduate students of entomology who have operated the projection equipment in the various sessions, and

WHEREAS, both the staff and students of the Department of Entomology at Rutgers University have extended their services and provided equipment beyond ordinary expectations for the successful conduct of this meeting, and

WHEREAS, the Staff of the Department of Entomology at the University of Delaware has provided some of the necessary equipment, therefore

BE IT RESOLVED, that this body go on record as thanking the various individuals in these two Departments for their unselfish services.

Resolution No. 4. WHEREAS, the Rockefeller Foundation has again made it possible for certain distinguished visitors to appear on our program, this year's guest speakers including Dr. George Harrar in addition to Dr. D. Blascovic and Dr. K. C. Willett, and

WHEREAS, the Bioferm Corporation sponsored Dr. A. W. A. Brown's Comstock Memorial Lecture, therefore

BE IT RESOLVED, that the Executive Secretary be instructed to express the thanks of the Entomological Society of America, including a copy of this resolution, to the Rockefeller Foundation and the Bioferm Corporation.

Resolution No. 5. WHEREAS, the Chalfonte-Haddon Hall Hotel management and personnel have assisted and contributed in many ways to a highly successful meeting, therefore

BE IT RESOLVED that the Secretary be instructed to write a letter of thanks, including a copy of this resolution, to the Manager of this hotel.

Resolution No. 6. WHEREAS, the Entomological Society of America has been ably served during the past year by President M. P. Jones, President-Elect H. M. Harris, Executive Secretary R. H. Nelson and the fifteen members of the Governing Board named on page 120 of the program, and

WHEREAS, the staff of the Executive Secretary has served our organization well during a difficult move to a new location, therefore

BE IT RESOLVED, that this body extend a vote of thanks to its officers and the staff of the Executive Secretary.

Resolution No. 7. WHEREAS, the publications of the Entomological Society of America have been expertly and conscientiously edited by Dr. F. W. Poos, Managing Editor of Publications and Editor of the JOURNAL OF ECONOMIC ENTOMOLOGY, Dr. R. L. Hussey, Editor of the ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA, Dr. Jerome Rozen, Editor of MISCELLANEOUS PUBLICATIONS, and Mrs. F. W. Poos and other editorial assistants, therefore

BE IT RESOLVED, that this body go on record expressing its grateful recognition of the contributions of these individuals.

Dr. Lilly moved the adoption of these seven resolutions. The motion was seconded by R. H. Davidson and carried.

Resolution No. 8. WHEREAS, the Entomological Society of America is keenly aware of the importance of an adequately staffed and supported Federal Insect Identification Service in the conduct of entomological research and regulatory operations, and especially for the survey and detection operations designed to protect the United States from accidental or intentional introduction of insects inimical to agriculture and public health, and

WHEREAS, the greatly expanded demands for service and technical guidance placed upon the present insect identification unit of the United States Department of Agriculture have not been accompanied by corresponding increases in support, the staff of this organization now being equal in size to the 1935 staff, even though the volume of work has doubled and continues to increase greatly in complexity, therefore

BE IT RESOLVED, that the *Committee on Insect Surveys and Losses* be requested to assist the Executive Secretary in the preparation of appropriate letters to be sent at the earliest practicable date to the agencies named below and any others which might aid, outlining the problem and emphasizing the need for additional support, and inviting assistance in attaining greater support for needed research and service in insect identification:

1. Secretary of Agriculture
2. Senate and House Agricultural Appropriations Committees
3. U. S. Public Health Service
4. Armed Forces Pest Control Board
5. National Agricultural Chemicals Association
6. National Pest Control Association.

Dr. Lilly moved the adoption of this Resolution. Seconded by C. B. Philip. Carried.

Resolution No. 9. WHEREAS, the Panel on Food Additives of the President's Science Advisory Committee has submitted a very timely and realistic report of their extensive studies on this important subject from the standpoint of the national welfare, therefore

BE IT RESOLVED, that the incoming Secretary of the Department of Health, Education and Welfare be urged to proceed with the recommendations of this Panel with respect to appointment of a distinguished Advisory Committee to work closely with the Secretary in studying the entire problem of food additives in order to provide the benefits of continued scientific judgment on such measures as may be necessary in the public interest.

Dr. Lilly moved the adoption of this Resolution. Seconded by E. R. Willis. Carried.

Resolution No. 10. WHEREAS, it is established that chemicals are essential in the production and protection of adequate quantities of quality food and fiber crops and products, and

WHEREAS, food producers look to the State Agricultural Experiment Stations and the Agricultural Research Service and the Research and Marketing Service of the U.S.D.A. to provide Cooperative Extension Service with the basis for recommendations for the use of chemicals for the production and protection of food, feed and fiber crops and products, and

WHEREAS, it is essential that such residue research be conducted as will permit publicly supported agencies to make recommendations for the use of chemicals in accordance with existing regulations, and

WHEREAS, the State Agricultural Experiment Stations in cooperation with the U.S.D.A. are conducting chemical residue research in each of the four regions, this research being concerned primarily with chemical residues in and on food crops, which residues are influenced markedly by geoclimatic conditions, and

WHEREAS, it is established that chemical residues in meat, milk and other animal products are influenced mainly by dietary levels and/or amount of exposure, therefore

BE IT RESOLVED, that for the more efficient conduct of this vital research and better exchange of information, State Agricultural Experiment Stations undertake cooperative research on residues in meat and milk on a national basis, rather than on a regional basis, and in cooperation with the U. S. Department of Agriculture, and

BE IT FURTHER RESOLVED that these agencies request more adequate support for the expansion of this program of research and,

FURTHER that copies of this resolution be transmitted to the Chairman of the Experiment Station Committee on Policy and the Administrators of the Agricultural Research Service and the Agricultural Marketing Service.

Dr. Lilly moved the adoption of this Resolution. Seconded by R. H. Davidson. Carried.

Resolution No. 11. WHEREAS, the regulation of pesticide usage within states is primarily an agricultural concern,

BE IT RESOLVED that the Entomological Society of America recommend that the enforcement of any state regulations of pesticide usage be primarily a responsibility of an agricultural agency in the state concerned.

Dr. Lilly moved the adoption of this Resolution. Seconded by J. C. Keller. Carried.

l. Additional Business. President Jones then called for additional business. There were no comments from the floor.

m. Remarks of the President. President Jones then expressed his appreciation to the members for the work of the committees by stating that no one could have asked for more wholehearted support than he had received from every committee member. He paid special tribute to those having to do with plans for the meeting, particularly the committees for the *Program, Local Arrangements, Ladies Entertainment, Exhibits, Photo Salon, Memorial Lectures,* and the students who operated the projection equipment and did other leg work during the meeting.

n. Introduction of President Arant. President Jones then asked Past Presidents R. L. Metcalf and B. A. Porter to escort President-Elect F. S. Arant to the platform and turned the gavel over to Dr. Arant with sincere good wishes for a successful year as President of the Society.

President Arant accepted the gavel and pledged his best efforts toward the continued advancement of the Society and of entomology. He noted the unprecedented events leading to his election which gave him only a few

days of preparation but expressed his optimism for 1961 and the Miami meeting.

o. Introduction of President-Elect Glen. President Arant called upon Past-Presidents E. F. Knipling and G. C. Decker to escort President-Elect Robert Glen to the podium. Dr. Glen expressed his appreciation of the honor especially in that it highlights the international aspects of the Entomological Society of America.

p. Adjournment. President Arant called for further business. There was none and the President declared the 1960 Business Meeting adjourned at 4:55 p.m.

Respectfully submitted,
R. H. NELSON, *Executive Secretary*

ACTIONS OF THE 1961 GOVERNING BOARD

Initial Meeting, November 30, 1960

The initial meeting of the 1961 Governing Board was called to order by President F. S. Arant at 4:10 p.m. on November 30.

1. COMMERCIAL EXHIBITORS

   The Board voted to permit the person in charge of a Commercial Exhibit to be given free registration at future meetings.

2. CONSTITUTION AND BY-LAWS

   In the light of the new Section 12 of the Constitution adopted by mail vote of the membership, the addition of six new Standing Committees through the years and certain other minor changes it was regularly moved and seconded that the Constitution and By-Laws be reprinted and that these changes, additions and corrections be properly included in the reprinted document.

3. MANUSCRIPTS

   In general discussion it was brought out that all manuscripts are given equal treatment. Any member may submit one. None are automatically accepted for publication, but rather all are subject to review by an Editor and/or an Editorial Board.

There being no further business President Arant declared the Board meeting adjourned until November 25, 1961. Adjournment at 6:00 p.m.

Respectfully submitted,
R. H. NELSON, *Executive Secretary*

REPORT OF THE AUDITOR

November 15, 1960

Mr. M. P. Jones, *President*
Entomological Society of America
4603 Calvert Road
College Park, Maryland

Dear Mr. Jones:

In accordance with the recent request of Mr. R. H. Nelson, Executive Secretary of the Entomological Society of America, I have made an examination of the financial affairs of your Society for the year beginning November 1, 1959, and ending October 31, 1960. As a result of my examination, there are attached the following exhibits:

EXHIBIT "A" General Fund—Statement of Receipts and Disbursements for the fiscal year ended October 31, 1960.

EXHIBIT "B" Permanent Fund—Statement of Receipts and Disbursements for the fiscal year ended October 31, 1960.

EXHIBIT "C" Entoma—Statement of Receipts and Disbursements for the fiscal year ended October 31, 1960.

EXHIBIT "D" Thomas Say Foundation—Statement of Receipts and Disbursements for the fiscal year ended October 31, 1960.

EXHIBIT "E" Building Fund—Statement of Receipts and Disbursements for the fiscal year ended October 31, 1960.

Branch funds have not been accounted for in this report. There are at present five branches. Each branch has its own bank account, and has the authority to make expenditures for its activities and to receive registration fees for its meetings. These branches are not required to account to the Entomological Society of America for their receipts and expenditures.

In my opinion, subject to the above comments, the accompanying statements fairly reflect the recorded cash receipts and authorized disbursements made for the benefit of Entomological Society of America for the fiscal year ended October 31, 1960, on a basis consistent with that of previous periods.

Very truly yours,
JOHN A. HERL
Certified Public Accountant

EXHIBIT "A"

ENTOMOLOGICAL SOCIETY OF AMERICA

GENERAL FUND

STATEMENT OF RECEIPTS AND DISBURSEMENTS

For the Year Ended October 31, 1960

BALANCE—NOVEMBER 1, 1959		**$19,171.62**
RECEIPTS		
Membership Dues—1960	$11,535.50	
—Other Years	4,752.25	
Membership Subscriptions:		
Journal—1960	23,053.55	
—Other Years	9,453.33	
Annals—1960	9,337.55	
—Other Years	3,856.42	
Bulletin	12,731.83	
Non-Member Subscriptions:		
Journal—1960	23,380.07	
—Other Years	3,126.83	
Annals—1960	6,573.60	
—Other Years	1,124.47	
Bulletin and Back Numbers	905.27	
Miscellaneous Publications	3,905.07	
Indices	3,096.65	
Annual Review	7,432.15	
Reprints—Journal	14,735.08	
—Annals	4,865.66	
—Bulletin	611.63	
—Miscellaneous Publications	412.53	
Advertising—Journal	2,478.50	
—Annals	314.90	
—Bulletin	138.80	
Paid Papers—Journal	1,917.25	
—Annals	1,455.14	
Back Issues—Journal	1,798.59	
—Annals	1,968.35	
Sustaining Associates	3,100.00	
Meeting Income	7,772.27	
Addressograph Services	442.45	
Brochure #1	78.50	
Building Fund Contributions	199.79	
Member Overpayments	76.44	
Decalcomania	10.25	
Entoma	125.30	
Travel Grants	32,800.00	
History of Entomology	33.00	
Overpayments	33.50	
Returned Checks Made Good	186.25	
Refunds—Travel	299.86	
—Other	184.06	
Net Bank Fees on Foreign Exchange	6.87	
Payroll Taxes Withheld	7,552.15	
Thomas Say Foundation	657.75	
Grants—Index	15,000.00	
TOTAL RECEIPTS		**223,519.41**
TOTAL CASH TO BE ACCOUNTED FOR		**242,691.03**

ENTOMOLOGICAL SOCIETY OF AMERICA

GENERAL FUND

STATEMENT OF RECEIPTS AND DISBURSEMENTS

For the Year Ended October 31, 1960

TOTAL CASH TO BE ACCOUNTED FOR		**$242,691.03**
DISBURSEMENTS		
Journal—Printing and Mailing	$35,589.57	
—Reprints	6,862.59	
Annals—Printing and Mailing	27,713.18	
—Reprints	1,941.33	
Bulletin Expense	11,946.85	
Miscellaneous Publication Expense	6,071.65	
Index	4,570.00	
Costs—Annual Review	8,338.55	
—Back Issues—Journal	232.14	
Expenses—Annals	656.50	
Redactory Services	2,266.00	
Miscellaneous Printing	2,376.61	
Miscellaneous Postage	3,182.72	
Telephone and Telegraph	354.78	
Office Supplies and Expense	2,302.16	
Purchase of Office Furniture and Fixtures	2,121.84	
Subscription Refunds	660.31	
Travel Expenses	1,118.97	
Meetings Expense	4,917.36	
Salaries and Wages	39,614.71	
Payroll Taxes—Employees' Portion	7,337.98	
Employers' Portion	749.09	
Advertising	90.00	
AIBS Bulletin	150.00	
Auditing	300.00	
Transfers to Building Fund	4,991.68	
Building Improvements	5,170.00	
Mortgage Reduction	1,200.00	
Building Operation and Maintenance	1,692.79	
Moving Office	300.00	
Contributions	210.00	
Entoma	19.00	
Grants—Index	834.80	
—Travel	31,992.16	
Insurance	487.27	
Membership—AIBS	3,790.00	
Memorial Lecture	500.00	
Retirement Annuity	632.00	
Returned Checks	186.25	
Safe Deposit Box	5.50	
Transfers to Thomas Say Foundation	633.88	
Transfer to Petty Cash from National Bank of Washington	28.64	
Payments for Thomas Say Foundation	3,276.81	
TOTAL DISBURSEMENTS		227,415.67
BALANCE—OCTOBER 31, 1960		**$ 15,275.36**
ACCOUNTED FOR AS FOLLOWS:		
Balance in Suburban Trust Co., Hyattsville, Md.	$15,214.18	
Petty Cash	61.18	
TOTAL		**$ 15,275.36**

NOTE: The comments form an integral part of this statement.

EXHIBIT "B"

ENTOMOLOGICAL SOCIETY OF AMERICA

PERMANENT FUND

STATEMENT OF RECEIPTS AND DISBURSEMENTS

For the Year Ended October 31, 1960

BALANCE—NOVEMBER 1, 1959		**$8,468.60**
RECEIPTS		
Dividends—Perpetual Building Assn.	$ 80.73	
—First Federal Savings and Loan Assn.	16.74	
—District Building and Loan Assn.	1.16	
Increment in Redemption Value of Series F, U. S. Bonds	214.50	
TOTAL RECEIPTS		313.13
TOTAL CASH TO BE ACCOUNTED FOR		**$8,781.73**

ABOVE BALANCE ACCOUNTED FOR AS FOLLOWS:

Face Value	Securities	Book Value
$6,500.00	U. S. Treasury—Series F.	$6,253.00
CASH:		
First Federal Savings and Loan Assn.		429.02
District Building and Loan Assn.		30.21
Perpetual Building Assn.		2,069.50
TOTAL SECURITIES AND CASH		**$8,781.73**

NOTE: The comments form an integral part of this statement.

EXHIBIT "C"

ENTOMOLOGICAL SOCIETY OF AMERICA

ENTOMA

STATEMENT OF RECEIPTS AND DISBURSEMENTS

For the Year Ended October 31, 1960

EDITION 13

BALANCE—NOVEMBER 1, 1959		**$ 71.70**
RECEIPTS		
Book Sales	$2,785.81	
Advertising and Listing	4,488.05	
TOTAL RECEIPTS		7,273.86
TOTAL TO BE ACCOUNTED FOR		7,345.56
DISBURSEMENTS		
Auditing Service	$ 10.00	
Envelopes and Labels	76.30	
Mailing and Postage	623.00	
Printing	4,903.95	
Promotional Supplies	83.50	
Honoraria to Authors	131.00	
Editorial and Secretarial Work	1,358.60	
Banking Service	2.47	
Refund	5.00	
Transferred to Entomological Society of America	100.00	
TOTAL DISBURSEMENTS		7,293.82
BANK BALANCE, OCTOBER 31, 1960		**$ 51.74**

NOTE: The comments form an integral part of this statement.

The above statement was prepared from information furnished without independent verification by me because of geographical distribution of original records. Therefore, no opinion can be expressed either as to its accuracy or to the consistency with which generally accepted accounting principles were applied.

EXHIBIT "D"

ENTOMOLOGICAL SOCIETY OF AMERICA

THOMAS SAY FOUNDATION

STATEMENT OF RECEIPTS AND DISBURSEMENTS

For the Year Ended October 31, 1960

BALANCE—NOVEMBER 1, 1959		**$4,117.89**
RECEIPTS		
Sales of Books	$1,889.01	
Interest	52.96	
Transfers from General Fund	633.88	
TOTAL RECEIPTS		2,575.85
TOTAL TO BE ACCOUNTED FOR		**$6,693.74**
DISBURSEMENTS		
Printing Volume 6		4,000.00
BALANCE—OCTOBER 31, 1960		**$2,693.74**
ABOVE BALANCE ACCOUNTED FOR AS FOLLOWS:		
Savings Account—Guardian Federal Savings and Loan		**$2,693.74**

NOTE: The comments form an integral part of this statement.

In addition to the above, payments in the amount of $3,276.81 were made by Entomological Society of America for the benefit of Thomas Say Foundation.

EXHIBIT "E"

ENTOMOLOGICAL SOCIETY OF AMERICA

BUILDING FUND

STATEMENT OF RECEIPTS AND DISBURSEMENTS

For the Year Ended October 31, 1960

TRANSFERRED FROM GENERAL FUND—NOVEMBER 1, 1959		**$4,795.38**
RECEIPTS		
Dividends	$203.39	
Contributions	677.00	
Transfer of Contributions from General Fund	196.30	
Sustaining Associateship	100.00	
TOTAL RECEIPTS		**1,176.69**
		5,972.07
DISBURSEMENTS		
None		
TOTAL TO BE ACCOUNTED FOR		**$5,972.07**
ACCOUNTED FOR AS FOLLOWS:		
BALANCE—OCTOBER 31, 1960, INTERSTATE BUILDING ASSOCIATION		**$5,972.07**

NOTE: The comments form an integral part of this statement.

HERCULES POWDER COMPANY AWARDS

Winners of six $400 college scholarships in the 1960 National 4-H Entomology Awards Program were announced in Chicago at the 39th National 4-H Club Contest on November 28, 1960.

Nearly 50,000 boys and girls from across the nation competed for the awards, sponsored for the past nine years by HERCULES POWDER COMPANY. Forty-six states competed in the program this year.

Scholarship winners were: Mary Ann Zwanziger of Volga, Iowa; Carl Castleton of Seabrook, New Hampshire; James W. Clark, Jr., of Vaughan, North Carolina; Jim Reinert of Fairmont, Oklahoma; Fay Udell of Lebanon, Oregon; and Jean Thomas of Floyd, Virginia.

The national winners were picked from among the state winners, all of whom received all-expense trips to the National 4-H Congress. Medals went to county winners.

The purpose of the Entomology Awards Program is to help 4-H Club boys and girls achieve the following objectives: Learn about insect life and the relation of insects to the health, wealth, and happiness of man; learn to recognize the major insect pests and the beneficial insects common to the area where the club member lives; understand the fundamentals of insect control by carrying on some control practice; learn about insecticides—the kinds, their specific uses, and safety practices to be followed; and support community projects and activities relating to insect control.

A dinner honoring the national and state winners was given by HERCULES. Company officials present at the dinner included John M. Martin, vice president, and Montgomery R. Budd, director of the Advertising Department. Mr. Budd is a member of the Entomological Society of America and the HERCULES POWDER COMPANY is one of our loyal Sustaining Associates.

State winners in addition to the scholarship winners are listed here. Congratulatory letters from home state entomologists are suggested for both groups of fine youngsters.

STATE	WINNER	ADDRESS
Alabama	Wilmer McAllister	Slocomb, Rt. 2
Arizona	Steve Orcutt	Phoenix, 133 E. Carter Rd.
Arkansas	Paige Kazmann (girl)	Stuttgart, 419 W. 7th St.
California	Vernelle Thompson	Red Bluff, Rt. 2, Box 2262
Colorado	Linda Sue Graham	Eads
Delaware	Elaine Cole	Newark, Rt. 1, Chapman Rd.
Florida	John Rumpf	Lockhart, Box 465
Georgia	Hubie Stephens	Devereaux, Rt. 4
Idaho	Roger Samson	Marsing, Box 125
Illinois	David Harms	Pleasant Plains, Rt. 1
Indiana	Louis White	Carthage, Rt. 2
Iowa	Mary Ann Zwanziger	Volga
Kansas	Martha Hurd	Ashland
Kentucky	Eddie Lee Grogan	Murray, Box 86
Louisiana	Dale Pollet	Gramercy
Maine	Nancy Miller	Lincolnville, Rt. 2
Maryland	Edward Benesch	Fallston
Michigan	Austin O'Malley	Melvin, RFD
Mississippi	Tommy Harris	Decatur, Rt. 2
Montana	Lorin Taylor (boy)	Billings, 2301 Alderson
Nebraska	Doug Sutton	Lincoln 3, 1344 N. 38th
Nevada	Shirlee J. Reed	Lee
New Hampshire	Carl Castleton	Seabrook, 32 Farm Lane
New Mexico	Mary Ann Albers	Albuquerque, 462 Isleta Blvd.
New York	Richard Spencer	Spencerport, 144 West Ave.
North Carolina	James W. Clark, Jr.	Vaughan
North Dakota	Ruby Johnson	Glenburn, Rt. 1
Ohio	Allen Nixon	Monroeville, Rt. 1
Oklahoma	Jim Reinert	Fairmont, Rt. 1
Oregon	Fay Udell	Lebanon, Rt. 3, Box 8
Pennsylvania	Jane Clarke	Centre Hall, Rt. 1
Rhode Island	Colleen Carlos	N. Scituate, Pine Hill, Rt. 3
South Carolina	Mabel Hinson	Manning, Rt. 3
Tennessee	Dorie Doss (girl)	Newbern, Highway 51, S. Rt. 2
Texas	Linda O'Dell	Pickton, Rt. 2
Utah	Alvin Lemon	Richmond, Box 204
Virginia	Jean Thomas	Floyd, Rt. 4
West Virginia	Creel Cornwell, Jr.	Lost Creek, Rt. 2
Wisconsin	Alice Lewerenz	New Richmond, Rt. 3
Wyoming	Roy Bastian	Egbert

REPORTS OF STANDING COMMITTEES FOR 1960

REPORT OF THE PROGRAM COMMITTEE

As is traditional with *Program Committees*, the program itself constitutes our major report.

The nearness of the printer in Baltimore and the abundance of Washington area entomologists who could be consulted on the many phases of Sectional papers and programs eased the work of the Chairman considerably this year.

Withall, preparation of the program consumed the total efforts of the Chairman for at least two very full weeks, in addition to that of the Secretary who typed the copy.

It is necessary to revert to 1956, the year of the Xth International Congress of Entomology at Montreal, to find a Society meeting that had so few submitted papers as this year. There were 175 in 1956, as contrasted to 218 in 1957, 228 in 1958, and 273 at the 1959 joint meetings with the Canadian Societies. This year's total is 186. International Congresses seem to have a significant effect on submitted papers presented at our subsequent annual meetings. This is understandable this year, with over 200 American entomologists in attendance at the Vienna Congress, August 17 to 25, many of whom presented papers to the Congress.

"Synopses," and stumbling over some of the forgotten phraseology, the latter observed ironically, "These are all so interesting, I wouldn't know which to attend."

Some preparatory work was saved this year by a "do-it-yourself" feature. Authors were asked to type or print their synopsis in a block on the form for submitting titles. These blocks were cut out, pasted in the proper sequence, and submitted directly as printer's copy.

A few subtleties crept into this year's program to lighten its drabness and monotony. Green ink was used. A few cartoons were introduced. Other material was interspersed wherever space was available at the conclusion of each day's program material. A few symbols were introduced on the meeting room chart and a little used definition of a Symposium applied to the Mixer.

One hundred and seventy-four of the 186 submitted papers announced in the program were received by the August 15 deadline. The remainder arrived before the copy was sent to the printer in the first week in September. It was necessary to refuse acceptance of four papers that were submitted weeks after the deadline. One inquiry was received as late as October 3.

Following is a Comparision of the various categories of submitted papers, symposia speakers, and invited speakers in 1959 and this year:

	Invited Speakers		Symposia Papers		Submitted Papers	
	1959	*1960*	*1959*	*1960*	*1959*	*1960*
PLENARY SESSIONS	4	12	6	8	—	—
SECTION PROGRAMS						
A. General Entomology	—	4	8	9	20	13
A-b. Teaching	—	—	5	3	—	—
B. Insect Physiology and Toxiology	—	—	10	5	58	60
C-a. Biological Control	—	1	4	—	17	22
C-b. Apiculture	—	—	7	9	2	—
C-c. Insect Vectors of Plant Diseases	2	—	2	5	13	5
C-d. Ecology and Bionomics	3	1	—	1	64	41
D. Medical and Veterinary Entomology	4	1	8	6	41	22
E. Control, Extension, and Regulatory Entomology	—	—	6	5	—	—
E-a. Extension	—	—	12	14	—	—
E-b. Plant Pest Control and Quarantine	5	—	—	5	—	—
F. Chemical Control Investigations	1	—	4	3	58	23
TOTAL	19	19	72	73	273	186

ANNUAL COMPARISONS

	Invited Speakers	Symposia Papers	Submitted Papers	Total
1960	19	73	186	278
1959	19	72	273	364
1958	10	62	228	300
1957	*	*	218	
1956	*	*	175	

* Not readily available.

Members at the 1959 meeting in Detroit voted to continue the arrangement of the program in a manner showing in one spot all submitted papers being presented at a particular time. Many suggestions were received that this also be extended to a detailed listing of symposia. This has now been accomplished by listing on facing left and right pages all concurrent sessions, by title and author(s), symposia speakers, invited speakers, or panel participants. Blank space resulting from such an arrangement has been utilized for other program copy. Synopses are listed separately.

Preparation of the annual program constitutes a valuable refereshser course in accomplishments and trends in the profession of entomology. However, while the Chairman and his Secretary were reading the proof of the

Several authors who were late in getting in their titles and synopses said that they did not see their June BULLETIN before going on their vacations. To give plenty of advance notice of the deadline, it is recommended that a tear sheet on which to submit the required information be printed as part of both the March and June BULLETINS.

Respectfully submitted,

D. O. WOLFENBARGER
EDWARD H. SMITH
RALPH W. SHERMAN, *Chairman*

Governing Board Action

The report was accepted and the excellent Atlantic City program noted with approval.

REPORT OF THE MEMBERSHIP COMMITTEE

1. *Recommendation to the Governing Board*—It is recommended that future vacancies on the ESA Membership Committee be filled by representatives from the various branches who are actively engaged in membership recruiting activities. This procedure is designed to provide for the coordination of activity and unification of responsibility of ESA and Branch Membership Committees.

It is further recommended that Chairmen-elect or Vice-Chairmen of the various Branches be informed of the need for close cooperation between the two committees by their Representative to the Governing Board, and that this goal be considered in the appointment of Branch Membership Committee Chairmen.

2. *Report*—The Membership Committee has endeavored to contact prospective members in colleges, universities, industries, and in state and federal organizations employing entomologists. The approach has been to point out the advantages of belonging to a professional society rather than to sell subscriptions to a periodical. Recruiting activities were carried on, not only in the continental United States, but also in Alaska, Canada, Mexico, Guam, Hawaii, and Samoa.

The Committee, through close cooperation with the five Branch *Membership Committees*, has also encouraged the affiliation of regional, state, and city entomological societies with the ESA. Such an affiliation serves to increase the interest and the membership of these societies in the ESA.

Recommendations were made to the Governing Board and to Branch Chairmen-elect with regard to appointments on *Membership Committees* to provide for closer cooperation between the ESA and Branch *Membership Committees*.

As of November 25, 381 new names were added to the membership list of the Society during the year.

The Committee desires to acknowledge and express sincere appreciation to all Society members who have contributed so much to the membership program.

Respectfully submitted,
G. F. Knowlton
C. C. Burkhardt
J. M. Grayson
A. C. Gunter
H. O. Lund
R. W. Rings, *Chairman*

Governing Board Action

The Board accepted the report and unanimously confirmed the election of the 381 new members.

REPORT OF THE COMMITTEE ON ENTOMOLOGICAL NOMENCLATURE

The Committee was again inactive, and on a standby basis, waiting for the long-delayed new International Code of Zoological Nomenclature. The Chairman continued his work on the Editorial Committee for the Code. This is in its final stages and publication is expected early in 1961. Next year's Committee should be prepared to scrutinize the Code *in extenso*, and to consider any improvements or objections that might be prepared for presentation to the next International Congress of Zoology in 1963.

Respectfully submitted,
Richard M. Bohart
Willis J. Gertsch
D. Elmo Hardy
George P. Holland
C. B. Philip
Paul O. Ritcher
Robert L. Usinger
Rupert L. Wenzel
Curtis W. Sabrosky, *Chairman*

Governing Board Action

The report was accepted by the Board.

REPORT OF THE COMMITTEE ON COMMON NAMES OF INSECTS

The committee considered proposals on common names for 85 species during 1960. These included 77 proposals for species not now on the official list, six to change approved common names, and two to drop one of two names for species. The committee approved 42 of the proposals, including 36 for adding species to the list, five to change common names, and one to drop a name. The committee-approved proposals will be published in the Bulletin and will be subject to objections from members before being finally approved.

As a result of work accomplished during 1960, the long-standing backlog of "new proposals" has almost disappeared. However, a considerable number of cases remain which require reconsideration or correspondence with persons concerned.

A revised list of the approved common names has been prepared and is scheduled for publication in the December, 1960, Bulletin.

Respectfully submitted,
W. J. Brown
Howard E. Evans
Ashley B. Gurney
H. F. Howden
L. C. Kuitert
Floyd D. Miner
Lloyd O. Warren
S. L. Wood
Jean L. Laffoon, *Chairman*

Governing Board Action

The Board accepted the report. The 1960 accomplishments were noted with approval.

REPORT OF THE COMMITTEE ON INSECTICIDE TERMINOLOGY

Four new names were accepted by the Committee during the year for addition to the list of approved common names of insecticides. These included names for two new fruit fly lures, cue-lure and trimedlure, a new name (deet) for diethyltoluamide, and a new insecticide, butonate. The names were published in the Journal of Economic Entomology, Vol. 53, pp. 677 and 955. None of these names had previously been submitted to the American Standards Association (ASA) or the International Standards Organization (ISO). However, the patent owner and the present distributor of butonate indicated that they would submit that name to both these organizations, and there is no reason to believe it would not be accepted by both.

An important conflict between the rules of ASA and ISO was brought forcefully to our attention during the year. A common name which this Committee accepted following its acceptance by ASA, ronnel, was rejected by the British Standards Institution, and apparently will be rejected by ISO because it was not composed of syllables from the chemical name. On the opposite horn of this dilemma, the patent holder is willing to release diazinon as a common name, but so far ASA has refused to accept this name, although it is in the process of adoption by ISO. The company has assured us that if it is accepted by ISO but rejected by ASA they will submit it directly to our Committee and, if accepted by us, release it for use as a common name in the United States. The Committee has been corresponding with the British Standards Institution, which is the Secretariat for ISO, and hope we will be able to coordinate our actions to the best advantage by keeping in direct touch with them. It will obviously be impossible to follow either ASA or ISO exclusively.

At the beginning of the year the Committee had under consideration a proposal to coin names for one or two commercial products which are now marketed under two or more trademarks. However, we learned that ISO also was considering proposals for common names for these products, and it seemed unwise to attempt to coin our own

names pending their action. The processes of ISO are very slow, and no ISO lists have yet appeared in print, although four are in various stages of approval. This Committee will keep in close touch with ISO, with the thought that names which appear destined for eventual adoption by this international group, and which are urgently needed by our Society, may be approved by our Committee prior to the inordinately delayed final processes of ISO.

Respectfully submitted,
JAMES E. BROGDON
J. EVERETT BUSSART
STANLEY A. HALL
RALPH B. MARCH
B. N. SMALLMAN
CARROLL N. SMITH, *Chairman*

Governing Board Action

The Board accepted the report. Appreciation was expressed for the work of this Committee.

REPORT OF THE COMMITTEE ON INSECTICIDE REFERENCE STANDARDS

The *Committee on Insecticide Reference Standards* has continued to coordinate the maintenance of standard insecticides for experimental purposes. The insecticide manufacturers have given excellent cooperation and supplied bulk samples and analytical data on these chemicals *gratis*. The Nutritional Biochemicals Corporation has devoted a great deal of time and effort in preparing, advertising and distributing these standards. We are deeply indebted to these manufacturers and the Nutritional Biochemicals Corporation.

The requests for Insecticide Reference Standards increase each year. The following compounds are currently available: aldrin, allethrin, Aramite (tech.), chlordane (tech.), DDT (tech.), *p,p'* DDT, dieldrin, endrin, heptachlor, lindane, methoxychlor (tech.), methyl parathion, ovex (tech.), parathion (tech.), Perthane (tech.), Phosdrin, Strobane and toxaphene (tech.). It is hoped that this list can be expanded in the coming year to include among the standards other insecticides which are in large scale production and are of uniform and reproducible quality. Such additional standards must be stable compounds with reasonably long shelf-lives so that the provided physical and chemical data including the percent of active ingredient will not change appreciably before use. Manufacturers and ESA members are urged to bring to the attention of this committee new compounds which meet these specifications.

Respectfully submitted,
L. H. DAWSEY
ROSMARIE VON RUMKER
J. E. CASIDA, *Chairman*

Governing Board Action

The report was accepted with appreciation.

REPORT OF THE COMMITTEE ON INSECT SURVEYS AND LOSSES

The committee met in Room 3115, South Agricultural Building, United States Department of Agriculture, Washington, D. C., May 9 and 10, 1960. An agenda of eight topics previously prepared by committee members and several additional items which came up during discussions was covered.

A visit with personnel and inspection of facilities of the Insect Identification and Parasite Introduction Research Branch, Entomology Research Division, Agricultural Research Service was arranged. This allowed members of the committee an opportunity to familiarize themselves with some of the problems resulting from the increase in insect survey activity. Increased responsibility assigned to the committee by amendment of Article VI of the By-Laws at the 1959 meeting of the Entomological Society of America was recognized and accepted. The following recommendations were agreed upon by vote of those present and with slight revisions resulting from correspondence between the chairman and committee members are submitted to the Society for approval:

1. Since various Branches of the E.S.A. have established Branch *Committees on Insect Losses*, since some of the Branch Committees have solicited aid and guidance for their activities and since some E.S.A. committee members are also members of similar Branch committees, the committee of the parent organization recommends that Branch Insect Loss committees include in their activities and interests Insect Surveys also, and that such committees be known as the respective Branch *Committees on Insect Surveys and Losses*.

2. In order to assist in the collection of the most meaningful and correlatable data possible, at the same time recognizing the necessity of developing new and more accurate survey methods, it is recommended that all Branch Committees urge the use of the *loss survey form* recommended by the E.S.A. *Committee on Insect Surveys and Losses*, and further that the Branch Committees and users of the present form suggest improvements in its content with the objective of making the form more useful.

3. The Committee recommends that the Plant Pest Control Division, Agricultural Research Service, assume leadership in assembling, publishing and distributing available information on methods of determining and reporting losses due to insects. It is further recommended that Plant Pest Control Division, A.R.S., assume leadership in determining areas where improved methods are required and in finding means of developing such improved methods in cooperation with the Entomology Research Division.

4. The Committee is convinced that the maintainance of an adequately staffed and supported Federal insect identification service is essential to the conduct of research and regulatory operations, and especially for the survey and detection operations designed to protect the United States from accidental or intentional introduction of insects inimical to agriculture and public health. The greatly expanded demands for service and technical guidance placed upon the present insect identification unit have not been accompanied by corresponding increases in support. The staff of that organization is now identical in size with that in 1935, although the volume of work has doubled and increased greatly in complexity. The Committee therefore requests that it be authorized to work directly with the Executive Secretary of E.S.A. to develop letters to be sent at the earliest practicable date to the agencies listed below, and others which might reasonably be expected to aid, outlining the problem and emphasizing the need for additional support and inviting assistance in attaining the objective of greater support for the identification agency.

Agencies to be contacted:

NACA
CPCA
AFPCB
PHS
County Agents (Fed. Agr. Ext. Ser.)

5. This Committee commends the Plant Pest Control Division, Agricultural Research Service on its excellent planning and expediting of the recommendation of this 1959 Committee that workshops be conducted for the purpose of more effectively conducting insect surveys and detection. Prior to this meeting in 1960, workshops were conducted in New York City, New York; Omaha, Nebraska; Lafayette, Indiana; Atlanta, Georgia; Baton Rouge, Louisiana; Walla Walla, Washington; Riverside, California; and Denver, Colorado. The Committee also commends the Insect Identification and Parasite Introduction Research Branch, Entomology Research Division Agricultural Research Service for its valuable

assistance in conducting the workshops and assisting in identification of the insects.

The Committee recommends that the Plant Pest Control Division sponsor additional workshops as needs arise. It further recommends that in addition to the Plant Pest Control Division, Extension Entomologists, State Departments of Agriculture and other interested public and private agencies within the respective states initiate similar educational programs toward the end of more adequate and comprehensive insect survey and detection programs.

6. The Committee is gratified by the generous response of taxonomists who were asked to identify insect material assembled as a result of an intensification and expansion of insect detection and survey efforts. The committee wishes to express its appreciation for such interest and cooperation in this program. Taking full advantage of this assistance has been hindered by problems in the mechanics of assigning specimens, by the Insect Identification and Parasite Introduction Research Branch, Entomology Research Division, on the basis of the usually finely drawn limits of the specialities of those taxonomists who offered assistance.

7. The Committee considers the several recommendation emerging from its deliberations are of sufficient urgency to warrant the submission of the Committee Report to the Governing Board of the Entomological Society of America at the earliest possible opportunity for its action. The committee recommends that the minutes of this meeting be distributed to the chairmen of all Branch Committees of a similar nature and also to other appropriate persons and groups as soon as practicable, contingent upon favorable action by the Governing Board of E.S.A.

8. The Committee submitted names for consideration in filling vacancies on the committee caused by retirement from this committee of those whose terms will expire at the end of the 1960 annual meeting of the Society. The Committee moved the adoption and proper channeling of these statements and recommendations through the office of the Executive Secretary, E.S.A.

9. It is suggested that an attempt be made for this Committee to have at least a short meeting sometime during the period of the Annual Meeting of E.S.A. for those members in attendance.

Guests:

W. H. Anderson
L. G. Davis
Emory Burgess
L. F. Curl
W. L. Seal
M. P. Jones
Richard Foote

Respectfully submitted,

J. N. Roney
Kelvin Dorward, *Ex Officio*
P. W. Oman, *Ex Officio*
J. W. Bongberg, for R. L. Furniss
J. H. Hughes, *Absent*
Herbert Knutson
N. O. Berry
E. W. Beck
R. W. Bunn
O. H. Hammer
L. D. Newsom, *Chairman*

Governing Board Action

The report was accepted. The Executive Secretary is to assist the Committee in any way he can.

REPORT OF THE COMMITTEE ON FINANCE

1. *Recommendation:* The Society should continue the membership dues at the present level for another year but it should plan for growth and developments that may require additional income in the future.

2. *Justifications:*

(a) The Society was able to operate within its income during the past year; however, it did so with difficulty owing to unexpected and non-recurring expenses connected with the move to the new headquarters. Essential improvements to the headquarters building also brought on unusual expenses. The debt on this building of $12,000 at 4 percent interest should be continued for the time being.

(b) Publication costs are expected to increase owing to rising costs and to the handling of a greater volume of papers. These costs can be partially offset by increased membership, purchase of reprints, and payment for advanced publication of papers.

(c) The new headquarters at College Park, Maryland, is being improved gradually as funds become available. The staff is doing a fine job in making the building serviceable and attractive. The exterior needs some work and the large lot could be better landscaped. A garage-type warehouse should be constructed during 1962 for storage of books and journals now located at various places in Washington and elsewhere.

(d) Consideration should be given, possibly next year, to increasing dues to the Society to meet increasing publication costs and other expenses.

Respectfully submitted,
H. G. Johnston
J. V. Osmun
S. E. Jones, *Chairman*

Governing Board Action

The Board accepted the report and approved the recommendation.

REPORT OF THE COMMITTEE ON PROFESSIONAL TRAINING, STANDARDS AND STATUS

The 1961 Chairman of this Committee, Dr. S. B. Freeborn, died July 17, 1960. There was insufficient time for the Committee to function under the *Chairman Pro-Tem* who was appointed by President Jones. Certain pertinent reports of study groups at the National Institutes of Health were supplied to the Committee members. The committee files and records were assembled and sent to the 1961 Chairman.

Respectfully submitted,
George G. Gyrisco
Charles G. Michener
Ralph E. Heal
John T. Creighton
Dale R. Lindsay, *Chairman Pro-Tem*

Governing Board Action

The foregoing report was presented orally by the *Chairman Pro-Tem* and was accepted by the Board.

REPORT OF MEMORIAL LECTURE COMMITTEE

Recommendations:

1. That there be published in the December Bulletin each year a brief but comprehensive statement as to what the Memorial Lecture is, the basis on which the annual lecturer is chosen, and to whom and by what date nominations therefor should be sent.

2. That the Governing Board adopt a policy as to the publicity, if any, that is to be given the donor of the honorarium for this lecture.

The major obligation of your Memorial Lecture Committee was discharged when it informed Executive Secretary R. H. Nelson on March 22, 1960, of its unanimous choice of Dr. A. W. A. Brown to deliver the John Henry Comstock Memorial Lecture in 1960. The Committee believes Dr. Brown will follow both the professional and personable high standards already set.

It is doubtful if service on any other Committee of the

Society affords its members more pleasure and satisfaction than had by this committee.

Respectfully submitted,
L. D. NEWSOM
E. A. STEINHAUS
R. W. SHERMAN
B. N. SMALLMAN
C. B. PHILIP, *Chairman*

Governing Board Action

The report was accepted and *Recommendation 1* approved for inauguration in 1961. *Recommendation 2.* The present policy is to be continued. This committee is to prepare the biographical material of each year's Lecturer for publication in the September BULLETIN.

REPORTS OF REPRESENTATIVES TO SCIENTIFIC BODIES FOR 1960

REPORT OF THE REPRESENTATIVE TO THE AMERICAN GRASSLAND COUNCIL

The annual educational meeting of the American Grassland Council was held in conjunction with the American Society of Agricultural Engineers, June 14–16, 1960, at Ohio State University, Columbus, Ohio. Two half-day sessions were devoted to the presentation of technical papers by leading scientists on new developments in the production, preservation and utilization of grassland crops. In addition, a half-day bus tour was made visiting large farm operations on which outstanding programs of grassland farming were practiced. The tour was concluded with an evening visit to an industrial installation featuring the manufacture of nitrogen fertilizer.

A new educational exhibit, shown for the first time, was on display at the Columbus Meeting. The theme of the exhibit was "Know Your Grasses and Legumes for Grasslands Preserve Our Civilization." Plant specimens of various cultivated legumes and grasses as well as range species used for pasture, silage, and hay, collected throughout the U. S., were featured.

The new quarterly *Grassland Progress* has helped to further one of the main objectives of the Council: The dissemination of information on new developments in the production, preservation, and utilization of grassland crops. This publication will enable grassland workers to keep in touch with new research developments in their chosen field. It is not only directed to workers serving agriculture but to grassland farmers as well. The Society's representative served on the editorial board during 1960.

The dates for the 1961 annual meeting of the Council have not been announced.

Respectfully submitted,
B. A. APP
ESA Representative

Governing Board Action

The report was accepted by the Board.

REPORT OF REPRESENTATIVE AAAS-CAMPBELL AWARD FOR VEGETABLE RESEARCH

Your representative, G. J. Haeussler, served on the panel of judges who selected from a field of 10 nominations a contribution to basic research on cytogenetics of tomato to receive the third annual AAAS-Campbell Award for Vegetable Research. The award, consisting of $1500 and a bronze medal, was presented during the annual meetings of the American Association for the Advancement of Science at Chicago, Ill., on December 28, 1959, to Dr. Charles M. Rick of the University of California, Davis, Calif.

The paper on which the award to Dr. Rick was based was published in Economic Botany, Vol. 12(4):346–367, 1958, with the title, "The role of natural hybridization in the derivation of cultivated tomatoes of western South America and non-random gene distribution among tomato chromosomes."

Floyd F. Smith, appointed to succeed Mr. Haeussler on the Award Committee, is presently rating the current year's group of nominations.

Respectfully submitted,
FLOYD F. SMITH
ESA Representative

Governing Board Action

The report was accepted by the Board.

REPORT OF THE REPRESENTATIVE TO THE DIVISION OF BIOLOGY AND AGRICULTURE NATIONAL RESEARCH COUNCIL

The Annual Meeting of the Division was held in the Conference Room, American Council on Education, 1785 Massachusetts Ave., Washington, D. C. It consisted of one half-day session, on Friday, March 25, 1960 and was a part of the Annual Meeting of the National Research Council convened at Washington from March 24–26. Five national biological societies had joined the Division during the past year and they were welcomed by the Chairman, H. Burr Steinbach. Applications for membership by additional societies will be in order but the present enrollment of 39 societies is considered adequate by the Executive Committee. Representatives from 32 of the societies were present in addition to 6 members at large, 8 liaison members and representatives of the staff.

The Committee on Pest Control—Wildlife Relationships, first advocated by Dr. H. J. Coolidge, held an exploratory conference on January 15, 1960. With pledges of financial support the Committee proceeded with its organization, and was activated. Three subcommittees have been established. One, with Dr. George Decker as Chairman, referring to its task as a problem inventory, will study past and current pest control operations. The second, under the chairmanship of Dr. Ira N. Gabrielson, will study research that has been done or is being done on the effects of pesticides on wildlife, etc. The third, of which Dr. Tom H. Gill is Chairman, will develop a manual that describes current practices that should yield good control of pests with minimum effect on wildlife.

Among other items of business it was unanimously resolved that a full day (instead of the half day in 1960 and previous years) be set aside for annual Division of Biology and Agriculture meetings, half a day for symposia, and half a day for Division business.

At the close of the annual meeting, the Division of Biology and Agriculture and the Division of Medical Sciences held a joint dinner at the Dupont Plaza Hotel, attended by about 75 people.

Throughout the year your representative is kept informed of the activities of the Division by friendly, monthly letters from Dr. Frank L. Campbell, Executive Secretary of the Division. It is always a pleasure to receive them and through them, know what's going on.

Respectfully submitted,
WILLIAM H. ANDERSON
ESA Representative

Governing Board Action

The report was accepted by the Board.

REPORT OF THE REPRESENTATIVE ON THE GOVERNING BOARD OF THE AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

Recommendations: (*1*) that the Society continue as a full member of AIBS and pay membership dues to the Institute at the rate of one dollar per year per individual active member; (*2*) that the Society cooperate as fully as possible in the various programs conducted by AIBS,

thereby assuming its proportionate share of the responsibility for such programs as well as deriving as fully as possible the benefits accruing from them.

Your representative attended the two meetings of the Governing Board held in 1960—May 12–13 at Boulder, Colorado and August 27 at Stillwater, Oklahoma. The meeting was held at Boulder in order to give all members of the Board first hand knowledge of the Biological Sciences Curriculum Study program which has its headquarters there. Excellent progress has been made on this major project of the AIBS (see October 1960 *Bulletin* pp. 19–20).

Much progress has also been made during 1960 on various projects conducted by the AIBS and only brief mention may be made here of some of these. More complete reports on many of them appear in the AIBS Bulletin from time to time.

The AIBS Biology News Bureau was established on December 1, 1959 with Harold Osborne, formerly science writer for the Seattle Times, as Director. A newsletter, "In Brief-In Biology", is now being sent to all members of member societies. It is also furnished to Secretaries of affiliate societies who wish to send it to their members. Major goals for the Biology News Bureau are: 1) to inform the public what biology is and what biologists do, of the contributions biologists have made to humanity in the past, of the importance now of biological research, and of the unlimited future of biology as a scholarly endeavor; 2) to present to biologists and to the public a picture of what AIBS is and what it is doing for biology.

AIBS Publications Activities are many and varied. The Bulletin increased frequency from 4 to 5 issues per year in 1960, exclusive of the August program issue. The fifth issue of the Journal of Wildlife Disease, organ of the Wildlife Disease Society, published as an experimental journal on microcards by that Society and AIBS, is scheduled for the fall of 1960. One of the major efforts of this section of AIBS is the program of translating into English Soviet biological journals and monographs. The *Style Manual for Biological Journals*, the text of which was prepared by a committee of the Conference of Biological Editors and adopted for use by a large number of biological journals including those of the ESA, is scheduled to appear in the early fall of 1960. Progress is being made in making available fiscal management and redactory services for journals of member societies.

Miscellaneous Activities are also many and varied, such as, Conferences, Symposia and Advisory Committees; Placement Service; Educational Activities; National Register of Scientific and Technical Personnel; International Activities, etc., etc. A Communications Study Project has been established with Lincoln Constance as Chairman of the Steering Committee and C. S. Shilling, formerly Deputy Director of the AEC Division of Biology and Medicine, as Director. The AIBS has become a complex of a great number of activities which exist to serve biology and biologists and to enable biologists to exert leadership in scientific matters throughout the world.

At the Annual Meeting of Biological Societies held at the Oklahoma State University at Stillwater August 28–September 1, 1960, approximately 1191 papers were presented in the sessions of 21 cooperating societies. There were 2166 paid registrations with a total attendance of about 3000. Future meeting sites authorized by the Governing Board are: 1961—Purdue University; 1962—Oregon State College; 1963—University of Massachusetts; 1964—University of Colorado.

Respectfully submitted,
F. W. Poos
ESA Representative

Governing Board Action

The report was accepted by the Board. *Recommendations 1* and *2* were adopted.

REPORT OF THE REPRESENTATIVE TO THE AGRICULTURAL RESEARCH INSTITUTE, NATIONAL RESEARCH COUNCIL

Your representative attended the annual meeting of the Agricultural Research Institute held in Washington, D. C., October 17 and 18, 1960. The first afternoon was devoted to the panel discussion entitled "The Interresponsibility of Land-Grant Colleges, Government, Industry, and Regulatory Agencies with Respect to Agricultural Research and Interpretation of Results to the Public." This title would indicate rather general treatment of administrative matters and releases concerned with them. Actually, as could be seen from such names on the panel as C. E. Palm (Cornell), J. K. Kirk (Food and Drug) and G. J. Krister (Du Pont Company) amongst others, the discussion related to the responsibilities of research agencies, chemical industry, and users to meet problems in the field of pesticides. It ranged over subjects from the reduction of undesirable chemical residues to improved public relations. The panel paid rather scant attention to food additives. This timely discussion penetrated to many basic facets of the present concern for and against chemicals in food production. A review might be appropriate reading for entomologists and for those large groups concerned in these responsibilities to the public.

The Agricultural Board, NAS-NRC, at its April 1960 meeting, moved instructing its executive committee "actively to seek means by which the Board can join promptly with other units of the National Academy of Sciences—National Research Council in a broad and authoritative analysis of the national consequences of the widespread use of food additives, pesticides, and other chemicals."

The conference on the "Role of Chemicals in Modern Food Production," originally slated to be held in Washington, D. C., November 21–22, 1960, has been postponed until late summer or early fall of 1961.

Respectfully submitted,
Harold H. Shepard
ESA Representative

Governing Board Action

The report was accepted by the Board.

REPORT OF REPRESENTATIVE ON THE NATIONAL PEST CONTROL ASSOCIATION PRETREAT BOARD

In my 1959 report it was indicated that the National Pest Control Association was working on an insured warranty program. This program, which is being underwritten by the Lexington Insurance Company, assures: (a) any retreatment necessary to protect treated buildings from termite attack, and (b) repair of damage caused by termites after treatment.

In view of the fact that the risk of this program is being carried primarily by an insurance company, the need for a PreTreat Board as originally conceived is less than had been anticipated. Until the success of the new warranty program has been fully demonstrated, it has been the decision of the Board of Directors of the National Pest Control Association to continue the PreTreat Board on a stand-by basis. It is recommended, therefore, that the Entomological Society of America continue its representation until such a time that it is truly demonstrated that the need for a PreTreat Board no longer exists. The NPCA has expressed its sincere appreciation for the continued support of the Society.

Respectfully submitted,
John V. Osmun
ESA Representative

Governing Board Action

The report was accepted and the recommendation for continued representation approved.

REPORT OF THE REPRESENTATIVE TO THE ORGANIZATION MEETING OF THE JOINT COMMITTEE ON AGRICULTURAL METEOROLOGY

Representatives of the various fields of meteorological application in agriculture held an organizational meeting in Kansas City, Missouri, May 17, 1960 in conjunction with the Third National Agricultural Meteorology Conference. As meteorology cuts across all agricultural areas, and it is impractical for the meteorologist to be expert in each, there is a need for coordination among those meteorologists who have some interest in agriculture and those agriculturists who encounter weather problems.

The organizations invited to participate in the meeting were: Entomological Society of America, Ecological Society of America, Society of American Foresters, American Society of Agronomy, American Phytopathological Society, American Society of Plant Physiologists, National Research Council, American Statistical Association, American Society of Horticultural Science, American Farm Economics Association, American Society of Agricultural Engineers, State Experiment Station Division of the U. S. Department of Agriculture, Federal Extension Service of the U. S. Department of Agriculture, and American Meteorological Society. A very high percentage of attendance of invited representatives was evidence of real interest among the societies. While certain animal sciences were not represented in the meeting, it was not an exclusion, but rather a historical development of the Agricultural Meteorology Conferences primarily in the area of plant sciences, entomology and plant pathology.

The representatives voted that a Joint Committee on Agricultural Meteorology be formed consisting of one representative from each of the above-listed organizations.

The representative agreed that some of the objectives of the Joint Committee should be:

1. To effect an exchange of information and ideas among agricultural scientists and meteorologists especially in regard to mutual understanding of the capabilities and needs of each group.

2. To support, and, as individuals, to help plan and present special symposia in individual fields of meteorological application, usually in conjunction with a meeting of that particular professional society.

3. To encourage and advise the Agricultural Meteorology Committee of the American Meteorological Society in continuing the National Conferences on Agricultural Meteorology.

4. To coordinate the dissemination of information pertinent to agricultural meteorology, including professional papers in society publications, monographs and popular articles.

It will be the responsibility of the American Meteorological Society representative and the active secretary of the Joint Committee on Agricultural Meteorology to keep in touch with other society representatives, and to call committee meetings whenever problems warrant, probably at a minimum of once each time a National Agricultural Meteorology Conference is scheduled. The next such meeting will be held no later than November, 1961, during the Fourth National Agricultural Meteorology Conference to be held with the American Society of Agronomy in St. Louis.

It is recommended that the Entomological Society of America continue to participate in the Joint Committee on Agricultural Meteorology and send a representative to the called meetings.

As there was no provision within the Entomological Society of America to pay travel expenses to the organizational meeting, and there is no legal disbursement of state travel funds to a state employee for the purpose of representing a society at a meeting, (at least in Wisconsin), it is recommended that the Governing Board consider the matter of travel expense in connection with appointment of future representatives. If the society cannot provide a travel budget for its representatives, appointment of future representatives to the meetings should be made among those interested individuals who can conveniently attend meetings with travel funds obtained from other sources.

Respectfully submitted,
JOHN T. MEDLER
ESA Representative

Governing Board Action

The Board accepted the report and approved future representation without payment of expenses.

REPORT OF THE REPRESENTATIVE ON COUNCIL OF THE AAAS

I have the President's memo requesting a report from me for the Atlantic City meetings as the Society's representative on the Council of the AAAS.

The last meeting of the AAAS. Council was in December 1959 at Chicago. Though I did not attend this meeting, I have received two AAAS. Council News Letters. I do not find that there are any matters that are of particular interest or concern to the Society.

Respectfully submitted,
H. RADCLYFFE ROBERTS
ESA Representative

Governing Board Action

The Board accepted the report.

REPORT OF THE REPRESENTATIVE TO THE SECOND INTERNATIONAL BIOCLIMATOLOGICAL CONGRESS

Dr. E. W. King and I attended the congress of the International Society of Bioclimatology and Biometeorology held in London September 4–10, 1960. At the invitation of Professor Sargent, President, we were designated by Dr. Jones as Delegates of the Entomological Society of America.

The International Society of Bioclimatology and Biometeorology was formed early in the last decade, to a large extent through the efforts of Dr. S. W. Tromp. Dr. Tromp is a geophysicist but in the course of his professional interests, he has been for many years interested in all aspects of bioclimatology.

At the present time, the membership of the society includes representatives of most of the countries of the world and members of a large number of scientific specialities. Prominent among the membership is the number of physiologists, allergists, public health officials, veterinarians, agricultural meteorologists and physicians. There is a number of entomologists in the organization, perhaps half the entomologists are from North America. Dr. W. G. Wellington, Victoria, Canada is the only entomologist on the executive of the society.

The London meetings were the third general gathering of the Society. The first meeting was held at U.N.E.S.C.O. headquarters in Paris. The second was a congress held in Vienna in 1957. About two-hundred scientists attended the London meetings as members of the society. Perhaps fifty more were guests. About thirty countries were represented, the congress was conducted in three languages with simultaneous translation provided for all general sessions.

The meetings included general sessions on topics such as Tropical Bioclimatology and Effects of Altitude. There were also a number of working groups established for discussions in areas of special interest. Within these working groups, informal presentations by individual members reporting current work were the most usual contribution. However, the working groups provided an effective arena for discussion and synthesis within areas of specialization.

Dr. King attempted to organize such a group of entomologists but the potential members apparently were previously committed to other discussion groups because the turn-out was not encouraging.

The Society of Bioclimatology and Biometeorology appears to be well established and vigorous. At the present time, it is in a phase of reorganization. This is made necessary by the usual problems of stabilization in an academic group which is interested in an area of considerable appeal to the amateur. At first, a number of poorly executed and prepared studies were submitted to the society journal and there was a considerable weeding problem to be faced in the preparation of meetings and of publications. Professor Sargent is making tremendous strides in his program for establishing the society standards of scholarly and scientific excellence. The present membership includes a number of workers of world reputation and there seems little doubt that the stature of the society will grow rapidly.

I feel that the entomological fraternity has a large contribution to make toward the Bioclimatological Society. A very large entomological literature exists in this field and some of the most fundamental and important work in bioclimatology is currently being done by entomologists.

The Society publishes a journal which in future will contain review papers. I expect that the journal will be a unique means of access to a tremendous literature which most entomologists presently do not review. The journal will probably be only a very occasional medium for entomological publication since it will apparently be review papers almost altogether.

I would hope that the Entomological Society of America could maintain scholarly contact with the International Society of Bioclimatology and Biometeorology. This would include the exchange of delegates at meetings; the mutual publication of meeting notices in the proper journals of each society; the provision of mutual library privileges for society members. A standing offer of access to society records such that it would be possible for members of either society to contact colleagues of special interests through the offices of the sister society would also be of use.

Respectfully submitted,
W. R. HENSON
ESA Representative

Governing Board Action

The Board accepted the report.

REPORTS OF EDITORIAL BOARDS FOR 1960

REPORT OF THE MANAGING EDITOR

As in 1959, this report deals with only four publications of the Society; The ANNALS, the BULLETIN, the JOURNAL OF ECONOMIC ENTOMOLOGY and the MISCELLANEOUS PUBLICATIONS. The financial records are given in the report of the Executive Secretary as required by the Constitution.

Recommendation:

1. That a list of approximately 50 proprietary compounds commonly referred to in our Society's publications be published at appropriate intervals in the JOURNAL OF ECONOMIC ENTOMOLOGY together with their respective chemical names thereby making it unnecessary to include the chemical definitions of these compounds when first mentioned in each article published, as now required by action of the Governing Board taken at Salt Lake City in 1958. (see March 1959 BULLETIN, p. 25)

The principal reasons for recommending this change are:

   a. Much space in our journals and time of our editors would be saved, primarily because of the confusing chemical nomenclature.

   b. Other biological journals do not give chemical definitions of proprietary compounds mentioned in their published abstracts.

   c. Many of our readers are no more familiar with the chemical definitions of the compounds bearing common names adopted by the Society than they are with those of the other compounds mentioned. If our readers must depend on a published list of one group of compounds it seems logical to have them do the same for the other.

2. If publication of the proposed list is authorized it should be prepared by the *Committee on Insecticide Terminology*, emphasizing the fact that the names included are not to be confused with nor accepted as common names which have been adopted by the Society.

Pagination Published.—Manuscript material submitted to the Society for publication continues to increase. The following tabulation gives the number of pages published during the past six years (no changes in format are involved):

Years	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*
ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA						
Pages	528	630	652	614	778	872*
BULLETIN OF THE ENTOMOLOGICAL SOCIETY OF AMERICA						
Pages	120	112	201	136	232	222*
JOURNAL OF ECONOMIC ENTOMOLOGY						
Pages	801	905	864	947	1262	1185*
MISCELLANEOUS PUBLICATIONS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA						
Pages					32	314

*Estimated

Circulation Data.—The Annals gained 153 subscribers of which 47 were non-members and the Journal had a net gain of 69 subscribers with a gain of 83 non-member subscribers, possibly the result of exchanging advertising with *Agricultural Chemicals* and exchanging subscriptions for advertising in a few other journals.

Year	*Copies Printed*		*Copies Mailed*	
	ANNALS (*Sept. issue*)	JOURNAL (*Oct. issue*)		
			ANNALS	JOURNAL
1956	1900	5400	1624	4927
1957	2100	5700	1842	5271
1958	2200	6000	1929	5269
1959	2400	6000	1984	5258
1960	2500	6000	2137	5327

ANNALS non-member subscribers, 595
JOURNAL non-member subscribers, 1857

Date of Issues: The date each number is issued appears at the bottom of its cover ii. The date of maling the issue is usually somewhat later. Therefore the dates the issues of the current fiscal year were actually mailed are given below:

ANNALS

November	(1959)—December 4
January	(1960)—February 5
March	—April 7
May	—June 8
July	—July 27
September	—October 5

JOURNAL

December (1959)	—January 11
February (1960)	—March 9
April	—April 22
June	—June 20
August	—September 2
October	—October 19

THE ANNALS OF THE ESA continues to grow in size as well as in circulation. Because of increased costs of printing by the Spahr and Glenn Co. at Columbus, Ohio, a change in printers has been made beginning with Volume 54 (1961). It will be much more convenient to deal with the Horn-Shafer Co. of Baltimore, Md., which firm now also prints the BULLETIN and the MISCELLANEOUS PUBLICATIONS OF ESA. The change will bring a more attractive cover and the use of the same size of type now used in the JOURNAL, effecting a considerable saving by gaining approximately 10% more words per page of the 9-point type. The change will also result in a considerable saving in the cost and handling of the engravings.

BULLETIN OF THE ESA.—All issues were mailed approximately on the dates scheduled except the September issue (Program Issue) which was mailed November 7. The December issue contained a list of members of the Society and an index to Volumes 1 through 5. The December 1960 issue will contain a new list of Common Names of Insects approved by the Entomological Society of America. Manuscript copy went to the printer on November 4.

MISCELLANEOUS PUBLICATIONS OF THE ESA.—Volume 1 Number 2 appeared February 17, Number 3 appeared July 27 and completed this volume with a total of 171 pages.

Volume 2 Number 1 (175 pp.) appeared October 19 and contains the papers on Research Progress on Insect Resistance given at a symposium held in Washington, D. C., in October 1959. Dr. J. G. Rozen has resigned as editor but will furnish enough edited copy to complete Volume 2.

Advertising.—Prospects for obtaining any substantial increase in the amount of advertising in ESA journals under present conditions are not good. Income from advertising in our journals is lower than last year. It therefore seems advisable to accept a proposal from AIBS for handling the advertising for the Journal of Economic Entomology.

Replying to my letter in which advertising was solicited, a representative of one large firm declined to advertise but stated that his Company had enjoyed the privilege of being a Sustaining Associate and also of being able to contribute on various occasions to sectional meetings around the country for program and entertainment purposes. Would that the members of our Society would solicit for financial support of their Society and its publications rather than for entertainment at their meetings!

Redactory Services.—This service has been furnished in part for the Journal of Economic Entomology by the AIBS during 1960 at $2.00 per printed page. No unfavorable comments on recent issues have been received. The service furnished consists of sending the edited manuscripts to the printer, reading galley proof, entering authors' corrections on the master copy, supplying running heads for page proofing, checking page proof against corrected galley proof and preparing the table of contents and index for the volume. Redactory service implies that copy editing is included. How soon the AIBS will be able to provide copy editing for our journals and what the cost will be have not been determined.

Other Services.—Miss Gladys Visel, employed as editorial assistant 14 hours per week resigned effective February 1. Miss Marion Steward, formerly of the U. S. Department of Agriculture, has been employed 20 hours per week beginning June 1. Much help from my understanding wife, Edna I. Poos, in reading proof and with other editorial chores is again acknowledged.

Respectfully submitted,
F. W. Poos,
Managing Editor

Governing Board Action

The report was accepted and the recommendations approved by the Board.

REPORT OF THE EDITORIAL BOARD

ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA

At the time this report is being written (9 November, 1960), the November issue of the ANNALS has not yet appeared, so that the exact number of pages for Volume 53 can not be given; however, a close estimate is 820 pages. The total through the September issue, No. 5, is 700 pages. The total number of pages for Volume 52 was 780, so that the current volume is somewhat larger. This is seen also in the 131 papers published in Volume 53 as compared with 106 in Volume 52; 19 of the papers in Volume 53 appear as "Scientific Notes". About 105 manuscripts were received in the 12 months ending 31 October 1960, of which 10 were rejected. The backlog has been reduced, and with the January 1961 issue already in the printer's hands, Dr. Hussey reports, as of 1 November 1960, some 45 manuscripts in his or the reviewers' hands.

The chief activity of the Board has been to review manuscripts at the request of the editor. There has been no change in the attitude of the Board toward that expressed in the 1959 report, that the editor should be free to consult as many or as few referees as he sees fit. The maximum number of manuscripts reviewed by one member was about 12; this reviewer comments on the great differences in quality of the papers, and expresses the view that every author should have his manuscript carefully criticized by a specialist in English before it is submitted. It might be added that authors should welcome, prior to submission of their papers, a check on validity of experimental procedures and results by colleagues proficient in statistics. One member believes that the Society should establish more rigid review procedures.

It is suggested that up-to-date instructions to contributors be published in an issue of the BULLETIN to cover all of the Society's publications, and that a notice in subsequent issues should direct attention to those issues containing instructions to authors, constitution and by-laws, membership lists, and lists of approved names of arthropods and chemicals. Another suggestion is to list the membership of the Editorial Board on the back of the title page in each volume, so that it will be available in bound volumes, in which the covers of individual issues are often missing.

The concensus of the Board is that the editor is to be commended on the excellence of the ANNALS. There is a broad coverage of entomological fields, and although classification is difficult, a general breakdown of the 1960 papers is as follows: morphology—9; taxonomy and distribution—40; ecology and biology—44; physiology and biochemistry—32; unclassified—6.

Beginning with the January 1961 issue, printing of the ANNALS will be done by The Horn-Shafer Company, Baltimore, Maryland.

Respectfully submitted,
J. A. ADAMS
J. J. PRATT
F. N. YOUNG
P. D. HURD
L. E. ROZEBOOM, *Chairman*

Governing Board Action

The report was accepted by the Board.

REPORT OF THE EDITORIAL BOARD

JOURNAL OF ECONOMIC ENTOMOLOGY

The Editorial Board wishes to commend Editor, Dr. Fred W. Poos, for his untiring and effective efforts in continuing to make the JOURNAL OF ECONOMIC ENTOMOLOGY an outstanding publication in the biological field. During the past year, the Board has consulted with the Editor

about such matters as the use of proprietary names in the Society's publications, the possible standardization of chemical nomenclature, and the suitability of various types of submitted manuscripts for publication in the Journal.

The JOURNAL continues to grow in both quality and quantity. Volume 53, 1960, will contain approximately 1,200 pages as compared with 1,035 pages in Volume 52, 1959, and 936 in Volume 51, 1958. As a result, the Editorial Committee has been kept busy assisting the Editor in reviewing and arranging for review of new manuscripts. The Referee System seems to be working smoothly and the criticisms are generally constructive and well received by prospective authors.

Respectfully submitted,
RUTH L. BUSBEY
G. J. HAEUSSLER
D. E. HOWELL
C. R. JORDAN, JR.
R. L. METCALF, *Chairman*

Governing Board Action

The report was accepted by the Board.

REPORT OF THE EDITORIAL BOARD

MISCELLANEOUS PUBLICATIONS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA

Except for a meeting held at Detroit, the members of the Board have conducted all business by mail and by telephone during the reporting period.

The principal order of business outstanding at the beginning of the tenure of this Board was to develop a specific set of editorial procedures for handling manuscripts submitted to the Subject Editor. This was successfully accomplished.

In August, the Board was greatly disappointed to receive the resignation of Dr. Jerome G. Rozen, Jr., the Subject Editor of the MISCELLANEOUS PUBLICATIONS. Steps have been taken to select a new Subject Editor and it is anticipated that this procedure can be accomplished during the forthcoming annual meetings at Atlantic City.

The Board desires to place on record its sincere appreciation of the services given to the Society by Dr. Rozen. His conduct of his duties has been outstanding and his loss is being felt most acutely.

Dr. Rozen is continuing his duties sufficiently long to edit the additional manuscripts needed to complete Volume 2.

Respectfully submitted,
WILLIAM G. EDEN
REECE I. SAILER
RAY F. SMITH
NEELY TURNER
KENNETH L. KNIGHT, *Chairman*

Governing Board Action

The report was accepted by the Board with thanks to the retiring Editor.

REPORT OF THE EDITORIAL BOARD

ENTOMA

The Editorial Board wishes to compliment Dr. Fisher and his staff for their efforts in concluding sales and business transactions for the 13th edition and initiating plans for the 14th edition of ENTOMA. In addition, the Editorial Board desires to express its appreciation to the six authors who contributed to the informational sections of the 13th edition and to the many state collaborators who helped solicit advertising and promote the sale of this publication.

Due to an increase in printing costs and greater postage expense, the 13th edition of ENTOMA has not earned as much for the Society as the previous edition. To correct this trend, advertising charges for the 1961–62 edition have been increased 15% and a comparable increase has been instituted for product listings by nonadvertisers. Dr. Fisher plans to use a lighter weight paper in the 14th edition as a means of reducing mailing costs.

With each issue of Entoma there have been a few complaints from pesticide manufacturers or formulators because they were not listed as suppliers. All E.S.A. members in commercial concerns should inform their advertising agency that there are no free listings in this publication but a company can obtain without additional charge a given number of listings with each quarter, one-half or full page ad. If no ad is taken, product listings cost $2.50 for the first plus 50¢ for each additional.

Respectfully submitted,
G. D. JONES
R. W. HARPER
R. W. ROTH
W. C. MCDUFFIE
J. W. APPLE, *Chairman*

Governing Board Action

The Board accepted the report with a recommendation that the cost of ENTOMA be increased by $1.00.

REPORT OF THE EDITORIAL BOARD

THE THOMAS SAY FOUNDATION

No manuscripts were received during the year. The sixth volume of the Foundation "A Synoptic Catalog of the Mosquitoes of the World (Diptera, Culicidae)" which was published October 15, 1959, was not paid for until after the end of the 1959 fiscal year. The cost of this volume (2000 copies) was paid on November 10, 1959 by withdrawing $4000 from the Thomas Say Foundation account and borrowing $3533.81 from the General Fund. The sales of the various volumes of the Foundation during the 1960 fiscal year are as follows:

Volume 1	6 copies
Volume 2	7 copies
Volume 3	7 copies
Volume 4	19 copies
Volume 5	18 copies
Volume 6	256 copies

Information on finances and sales furnished by the Executive Secretary.

Respectfully submitted,
W. W. WIRTH
MAURICE T. JAMES
HERBERT T. DALMAT
LEIGH E. CHADWICK
HOWARD O. DEAY, *Chairman*

Governing Board Action

The report was accepted.

REPORT OF THE COMMITTEE

INDEX TO THE LITERATURE OF AMERICAN ECONOMIC ENTOMOLOGY

INDEX XVII (for 1958), a volume of just over 500 pages, has gone to the printer and may be ready for distribution before the end of 1960. This is the second volume compiled by Helene G. Cushman. A moderate beginning has been made on the preparation of INDEX XVIII (for 1959) but a great deal of work remains to be done before assembly and editing of references can start. After considerable study there was authorized a single column format for INDEX XVIII This will simplify preparation of the Index and, it is believed, make it easier for users to locate main headings and references. It is estimated that this change will increase the size of a volume by about 15 percent, the cost of which will be offset in large measure by a saving of around 20 percent in typing costs. A study of headings, subheadings, etc. is underway in a further effort to simplify future editions of the Index and to make it still easier to locate references.

In May 1960 there was approved by the National Science Foundation Grant NSF–G12434 in the amount of $26,300 for use over a two-year period in support of the preparation of the Index to the Literature of American Economic Entomology. This has made it possible for the Society to employ an indexer, Miss Rebecca Wise, and a typist to assist the United States Department of Agriculture Library staff in the preparation of the Index, especially to overcome the backlog of indexing and maintain it on a current basis. Miss Wise assisted in the completion of INDEX XVII. The volume of references is now so great and the support available to the U.S.D.A. Library for indexing so limited that it can no longer do the whole job. This grant insures two additional volumes of the INDEX and gives the Society time to determine if and on what basis it can issue future volumes. The future of the INDEX deserves serious consideration during the coming year. There is no other comparable index to American entomological literature available. This is indicated in a statement presented to the National Science Foundation in support of a request for a grant to enable the Society to finance the preparation and publication of non-current volumes of the INDEX.

It is recommended that there be assembled during 1961 an estimate of the cost of assisting the U.S.D.A. Library in the preparation of future volumes of the INDEX, the cost of printing, and the extent to which the Society can afford to underwrite such costs, or the price that would have to be charged members, non-members and libraries for the INDEX to pay its way. It is further recommended that the 1961 Committee explore the feasibility of supporting, operating, or promoting the initiation of an IBM code card indexing program in lieu of continuation of the INDEX and receive estimates of the cost thereof.

Respectfully submitted,
THEO. L. BISSELL
C. F. MUESEBECK
HOWARD BAKER, *Chairman*

Governing Board Action

The report was accepted by the Board.

REPORTS OF SPECIAL COMMITTEES FOR 1960

REPORT OF LOCAL ARRANGEMENTS COMMITTEE

The selection of *Committee on Local Arrangements* Chairman for the 1960 E.S.A. meeting was made by Pres.-Elect Jones at the Salt Lake City Meetings of 1958. During the year 1959, the Local Arrangements Chairman was kept informed partially on the development of the 1959 Detroit Meeting by the Detroit *Local Arrangements* Chairman. However, there was little practical knowledge gained from this indirect activity. At the Detroit Meeting, the Atlantic City Chairman did meet on numerous occasions with the Detroit Committee and observed the proceedings closely. Several personal word comments of the Detroit Committee and visual observations were of great value to the Atlantic City Chairman.

At the Detroit Meeting, selection of the entire committee for Atlantic City meeting was completed between Pres. Jones and the Chairman. Committee members accepted without exception and duties were assigned. Members of the Society residing in the area near Atlantic City were chosen.

Liaison was immediately established with the *Program Committee* Chairman and the Executive Secretary. At the 1959 Eastern Branch, E.S.A. Meeting in Atlantic City, the hotel management, the officers of the Society and the *Local Arrangements* Chairman met and ironed out many details. Later in the winter of 1959–1960, the *Local Arrangements* Chairman visited the meeting hotel twice to make further arrangements for the meeting.

On July 11, 1960, the *Local Arrangements Committee* and the *Program Committee* Chairman met in the meeting hotel. At this time, reports of the various members on assigned duties were accepted. It was of great value to have the Program Chairman present. A copy of the proceedings is attached as Appendix 1.

A second meeting of the *Local Arrangements Committee* was held at Eastern Branch E.S.A. Meeting on October 27, 1960. Further reports were heard and Pres. Jones and the Executive Secretary spoke to the group. A copy of these proceedings is attached as Appendix 2.

There are several suggestions which the *Local Arrangements* Chairman would like to make at this time, based on the Committee's experiences.

(1) That the report of the local arrangements committee be made available to the succeeding local arrangements chairman. The 1959 report if one were made, was not included in the Report of the 1960 meeting.

(2) That the local arrangements chairman-select be present at the preceeding meeting of the Society to maintain continuity of the operation.

(3) That the Executive Secretary develop and use a standard operating procedure for special committees, such as local arrangements, in order to facilitate their operation. At times the *Local Arrangements* Chairman did not know whether he or the Executive-Secretary or the Program Chairman was to handle certain items pertaining to local arrangements. Fortunately, all these matters were taken care of with minimum loss of effort. Such standard operating procedures could be very valuable, particularly as the Society grows larger and meeting arrangements become much more complex.

Respectfully submitted,
D. LYLE GOLEMAN
L. E. HAGMANN
J. L. LIBBY
H. F. PIERCE
H. L. SMITH
D. E. ULLRICH
D. F. BRAY, *Vice-Chairman*
L. G. MERRILL, JR., *Chairman*

Governing Board Action

The Board accepted the report and adopted the recommendations.

REPORT OF THE INSECT PHOTO SALON COMMITTEE

The insect photo salon of the Entomological Society of America is enjoyed by a high percentage of those attending the meeting. Most of the members I have contacted want this to be a permanent part of our national meetings. There are far too few members participating in the salon by sending pictures for competition.

Recommendations:

(1) Bring more continuity into the insect photo salon by having members of the insect photo salon committee of one year guide and help the members of this committee the next year.

(2) Encourage the membership to enter pictures for competition in the insect photo salon by

(a) Limiting the entries for competition to the membership only.

(b) Inviting amateur judges to judge the entries.

(c) Inviting special talks on the art or science of photography to stimulate better photography in our membership.

(d) Inviting photographic equipment companies to exhibit.

(e) Encouraging the branches to have photo salons and enter the prize winning pictures for competition in the salon of the national meeting.

I would like approval of payment of the room expense (2 nights) of each of the three PSA judges, Dr. Kaston, Prof. George Johnson, and Warren Savary, at the Atlantic City meeting by the Society.

Respectfully submitted,
J. ALFRED ADAMS
J. R. HOFFMAN
J. O. PEPPER
RAY R. KRINER, *Chairman*

Governing Board Action

The Board accepted the report with appreciation of the Chairman's enthusiastic interest. The recommendations were approved.

REPORT OF THE EXHIBITS COMMITTEE

Sixteen exhibitors occupied booth space in Stair Hall and the English Lounge at the meeting of the Entomological Society of America at the Hotel Haddon Hall Atlantic City, New Jersey, November 28, 29, 30 and December 1, 1960. Some of the educational exhibits required more than one booth space so that a total of 18 spaces were occupied.

There were a total of 10 industrial exhibitors. Of these, 9 were sponsored by individual firms. The tenth, representing a new type of exhibit, was sponsored by a group of book publishers. Commercial exhibitors were charged at the rate of $15.00 per running foot, except for the book publishers who were charged $3.00 per book title.

The *industrial exhibitors* were as follows:

1. B and G Company, Plumsteadville, Penna.
2. Charles J. Lane Corp., New York, New York
3. E. L. Bruce Company, Memphis, Tennessee
4. Floridan Company, Tallahassee, Florida
5. Gandy Company, Inc., Owatonna, Minnesota
6. Pest Control Equip. Company, Mt. Vernon, New York
7. Rohm & Haas Company, Philadelphia, Penna.
8. Shell Chemical Company, New York, New York
9. Union Carbide Chemicals Corp., New York, New York
10. Various Book Publishers

The *educational exhibitors* were as follows:

1. New Jersey Mosquito Extermination Assoc.
2. Department of the Navy, Bureau of Medicine and Surgery
3. Office of Public Health, International Cooperation Adm.
4. Armed Forces Pest Control Board, Armed Forces Institute of Pathology
5. Plant Pest Control Div., Agricultural Res. Service
6. Plant Quarantine Div., Agric. Research Service

The 4-H Club exhibits in the English Lounge consisted of an unusually fine display of larval and adult insects, an illuminated display panel, and a 4-H Achievement Record Book. These exhibits were supplied by the following states:

1. Alaska
2. Michigan
3. New Jersey
4. New York
5. North Carolina
6. Pennsylvania

4-H demonstrations on "Robber of Watermelon Profits" (North Carolina), "Bees" (North Carolina), and "Scientific Studies With Insects" (Michigan), were presented to the membership of the Entomological Society of America. They were presented also at the high schools in Atlantic City and Mays Landing.

Financial Statement

Received from industrial exhibitors		$1605.00
Expenditures:		
Postage	$ 28.00	
Exhibitors Display & Decorating Co.	310.00	
Haddon Hall Hotel Exhibit Space	265.00	
Haddon Hall Hotel Electrical Outlets and Spotlights	43.00	
Haddon Hall Hotel Gratuities	18.00	664.00
Net Profit		$ 941.00

Respectfully submitted,
L. E. ADAMS
ARNOLD MALLIS
A. A. MUKA
H. E. SCOTT
D. R. SHEPHERD
E. N. WOODBURY, *Chairman*

Governing Board Action

The report was accepted by the Board with appreciation for excellent results.

REPORT OF THE COMMITTEE ON PUBLIC RELATIONS

Your 1960 *Committee on Public Relations* studied its assigned problems long and diligently. It reviewed the various recommendations made by its predecessors, held meetings to discuss these and other problems, and held conferences with Society members in various parts of the country.

It was concluded at a committee meeting held in Wilmington, Delaware, May 5, 1960, that 1) the work of temporary committees, such as this one, can be only temporary in nature; i.e., operations which can be conducted successfully within a given year, and 2) that standing committees must develop and materialize long-range plans requiring a) approval by the Governing Board and b) establishment of organized channels of communication requiring effort of many people. The 1960 Committee did these things: 1) prepared and developed long-range plans requiring a) approval by the Governing Board and b) establishment of organized channels of communication requiring effort of many people. The 1960 Committee did these things: 1) prepared and developed long-range, continuing public relations plans for the review and approval of the Governing Board, 2) took action on problems that could be completed within the year.

1. *Proposed Long-Range Public Relations Programs for Entomology*

A program was prepared for improving public relations and welfare in entomology. To make this program work will require a) a standing committee in the Society, with an approved objective or purpose (see attachment A), b) over-all operational plans (see attachment B), c) a "central" news staff (Mr. Hall's) to produce copy in the form of news releases, taped speeches, radio and TV copy, with directions for state use of such material, and d) committees in each state to help move prepared informational material into local communications channels.

The Committee recommends the establishment of a standing committee for "Public Information and Professional Welfare."

The Committee recommends, since continuity of effort will be essential to the success of the proposed program, that membership of the present temporary committee be retained for 1961, that one member be relieved of his duties each succeeding year and that a new member be selected to take his place.

It is further recommended that an arrangement be made by the Society, a Foundation, or some other interested agency, to make a statistically provable survey of

public attitudes toward entomology and entomologists. Only on the basis of provable facts can a program be fully evolved toward improving specific problem areas. Such a survey should be made at intervals so that program progress can be determined.

2. *Committee Actions Taken in 1960*

Your Committee:

a). Helped select the theme "Entomological Contributions to Human Welfare" as a suitable public relations vehicle; helped the Chairman of the Program Committee select persons who should be invited to speak toward the theme; prepared press releases for each selected address.

b). Made arrangements through committee member Dr. Bailey Pepper to obtain the services of the New Jersey extension editor to take active charge of press relations at the 1960 Atlantic City, N. J., meeting, activate a press room, meet the working press, make available to the press the releases prepared by the Committee, and contact potential radio and television outlets in the New Jersey and New York areas for suggested network radio and TV shows.

c). Prepared an operational procedure to better press coverage of Branch meetings;

d). Made an attempt to determine present public reaction to entomologists and entomology by means of public interviews on a field trip through 18 states; discussed plans for a public relations program in entomology with various research, extension and regulatory entomologists, State Directors of Extension and Experiment Station Directors.

e). Opened negotiations with the appropriate Assistant Secretary of Agriculture, Mr. Ferguson, to obtain official sanction and approval for USDA and Land-Grant College employees to participate and actively engage in the proposed educational program.

f). Investigated methods which might be used for obtaining statistical evidence of public opinion in relation to entomologists and entomology so that progress in public relations activities might be measured from time to time.

Respectfully submitted,
B. B. PEPPER, Research Representative
H. L. GUNDERSON, Extension-teaching Representative
ROY G. RICHMOND, Regulatory Control Representative
MONTE BUDD, Industry Representative
DAVID G. HALL, *Chairman*

Governing Board Action

The report was accepted. The Board agreed to recommend to the membership that a standing *Committee on Public Information* be established with the present committee members continuing.

REPORT OF THE COMMITTEE ON ENTOMOLOGY IN OUTER SPACE

Governing Board Action

The submitted report was reviewed by the Board but no specific action was taken. The Committee was discharged pending possible presidential action in the future.

REPORT OF ESA-AIBS COMMITTEE ON JOINT MEETINGS

The Governing Board of the Entomological Society of America instructed President M. P. Jones to set up a committee to give consideration to certain sections of the ESA holding occasional joint meetings with the American Institute of Biological Sciences. The undersigned were appointed by President Jones to serve on this committee.

The first step taken by the committee in carrying out this assignment was to forward to the chairmen of sections A, B, and C (including all 4 subsections) a statement of the advantages and disadvantages of joint ESA-AIBS meetings. Each chairman was requested to take the matter up with the executive committee of his section and either ascertain the wishes of the membership through appropriate mail ballot or present it at the business meeting in Atlantic City in December, 1960. A copy of the statement sent to section chairmen is attached.

The comments received from the section chairmen were generally favorable, although some opposition was expressed. The officers in section B were able to take action because they had received such authorization from the members present at the 1959 business meeting. Accordingly, they have requested permission to hold a joint meeting with the American Society of Zoologists at the AIBS meetings at Purdue University during August of 1961. The matter of joint meetings is to be discussed at the 1960 business meeting of section A, and perhaps it will be discussed in the business meetings of certain subsections of section C.

The committee feels there is soundness to the idea of certain sections of the ESA holding occasional joint meetings with the AIBS, but that it would not be wise to proceed too rapidly in implementing the idea. Perhaps it would be best to schedule only one such joint meeting each year. In this way, both the sectional and the overall members of the ESA will have an opportunity to evaluate the true advantages and disadvantages of joint meetings, and any early mistakes which may be made can be corrected. It is evident that the committee should be continued for at least another year if its assignment is to be completed and the problem of joint meetings more fully resolved.

In summary, the committee makes the following recommendations:

(1) That section B, ESA, be permitted to hold a joint meeting with the American Society of Zoologists at the AIBS meetings at Purdue University in August of 1961.

(2) That, as a beginning policy, only one section of the ESA be authorized to hold a joint meeting with the AIBS in any one year.

(3) That the ESA-AIBS Committee on Joint Meetings be continued through 1961.

Respectfully submitted,
LAURENCE S. JONES
PHILIP C. STONE
JAMES McD. GRAYSON, *Chairman*

Governing Board Action

The report was accepted. It was noted that *Recommendations 1* and *2* are covered by Constitutional provision and previous Board action. The committee is to be continued.

REPORT OF LITERATURE CITATIONS COMMITTEE ANNUAL REVIEW OF ENTOMOLOGY

This committee was assigned the task of working "with the editor of the Annual Review of Entomology toward the goal of making the literature citations of articles in the Review more useful by inclusion of full titles, abbreviated titles, annotations, or by some other means".

The committee worked closely with the editors as directed and enjoyed the best cooperation in seeking a solution to the problem. Preliminary discussions were started on June 22, 1960 after a May 31, 1960 letter from J. Murray Luck stated that the Board of Directors of the Annual Reviews has indicated its willingness to amend its present policy. Exchanges of letters between committee members were halted abruptly when the Editorial Committee of the Annual Review of Entomology came to the following decision (quoted from the Preface of the next volume):

"After considering all aspects of the situation, after consulting with entomologists with different interests,

and after obtaining the approval of the Governing Board of Annual Reviews, Inc., the Editorial Committee decided to permit the inclusion of titles in the bibliographies even though this will reduce the number of pages of text in each volume. In addition, beginning with the present volume a new double-column reduced type-size format is being used for the bibliographies. The space saved by this change will, in part, help provide space for titles. Of course, were titles not to be used this same saving of space could be used for more text. In any event, it is hoped that the inclusion of titles and the change in formats are in accord with the wishes of most of the readers of the Review, and that it will be an added service to entomologists seeking comprehensive reviews of subjects of their interest. We shall appreciate hearing from any of our readers concerning the matter after enough volumes have appeared with titles to enable a comparison to be made."

This concludes the report of our committee and terminates the business for which the committee was appointed.

Respectfully submitted,
G. E. BOHART
G. J. HAEUSSLER
R. L. USINGER, *Chairman*

Governing Board Action

The report was accepted and the committee discharged with thanks.

REPORT OF SPECIAL COMMITTEE ON ESTABLISHMENT OF STANDARD TEST METHODS FOR DETERMINATION OF INSECT RESISTANCE

This special committee was appointed by President M. P. Jones in the Spring of 1960. A preliminary committee meeting was held at the Pacific Branch meetings at Spokane in June as three of the four members were in attendance.

Agreement was unanimous that precise laboratory methods must be developed for agricultural arthropod pests in order to determine present and future shifts in dosage-mortality response curves. The purpose of this committee was determined to be the suggestion of methods for standardization and encouragement of entomologists to use them wherever possible. Methods must be precise and in enough detail for repetition by all workers so data developed will be comparable from area to area. A minimum of suggested methods applicable to as many species as possible should be proposed. Currently available, satisfactory methods should be proposed wherever possible.

Committee assignments were made at Spokane for discussion by the committee at Atlantic City meeting of the Society. A preliminary draft of standard methods has been prepared for consideration of the committee.

As a result of parallel interest among our Canadian colleagues, Dr. H. Hurtig, Canadian Department of Agriculture, Ottawa, has been invited to meet with the committee.

Respectfully submitted,
A. W. LINDQUIST
G. F. LUDVIK
K. D. QUARTERMAN
H. T. REYNOLDS, *Chairman*

Governing Board Action

The report was accepted and the Board recommended the continuation of the Committee.

REPORT ON SUSTAINING ASSOCIATE COMMITTEES

I was asked by President M. P. Jones to investigate and report on the activity of the Branch Committees for securing Sustaining Associate Memberships. Letters were sent to the Chairman of each Branch making inquiry of the Committee activity. The answers from the Branch Chairmen indicated as follows:

Eastern Branch

There is a Committee but very little active effort directed toward securing additional Sustaining Associates for the Entomological Society of America.

South-Eastern Branch

A Committee was appointed in previous years but apparently little activity during the Year 1960.

North Central Branch

Thirty-One (31) letters, with attached application for Sustaining Associate Membership, were mailed to companies who are not Sustaining Associate Members. Only two (2) companies replied to this inquiry and their answer was negative.

Southwestern Branch

They report they do not have a Sustaining Associate Committee.

Pacific Branch

I received no answer to my letter of inquiry but I have heard there is no active Committee.

Possible Action by the Governing Board

Sustaining Associates pay $100.00 per year and receive only the BULLETIN for this membership. I would suggest some consideration be given by the Governing Board to have them also receive the JOURNAL OF ECONOMIC ENTOMOLOGY or the ANNALS with this type of Membership.

It is proposed the President be instructed to appoint a temporary committee to consider the Society provisions for Associate Membership. If this Committee expresses the need for a *Sustaining Associate Committee* the President should be instructed to appoint such a Committee. Such a Committee could consist of the Chairman of the Branch Associate Membership Committees.

Respectfully submitted,
J. EVERETT BUSSART

Governing Board Action

The report was accepted but the Board took no action on the proposals to the Board.

REPORT OF THE GOVERNING BOARD COMMITTEE ON PUBLICATION POLICY

Appointment of a Governing Board *Committee on Publication Policy* was authorized by the 1959 Board, in order to advise the Managing Editor, at his request, upon matters of publication policy arising between meetings of the Board.

During 1960, the principal question referred to the Committee was the desirability of accepting the recently prepared AIBS Style Manual as a guide for publications of the Entomological Society of America. The matter was referred to the Committee just before the manual was scheduled to go to press and it was not possible to give the manuscript as detailed a review as we would have liked. Nevertheless, and in spite of the fact that it appeared to have some weakness, the Committee considered it desirable and in the interests of reasonable uniformity in biological publication for the ESA to join with other biological societies in adopting the manual as a general editorial guide. In so doing, it was understood that the Managing Editor would not be bound by details of form and style where Governing Board policy, Society tradition, or special circumstances dictated otherwise. During consideration of the desirability of accepting the manual, the Committee made suggestions for its improvement. It is our understanding that these were considered and largely accepted.

A second policy matter, relating to publication in the Journal of Economic Entomology of a list of proprietary compounds commonly referred to in Society publications, was sympathetically received by the Committee. However, the question relates to prior Governing Board Action and appears in the Managing Editor's report as a recommendation for consideration by the entire Board.

Finally, in view of the fact that the Board Committee was established at the request of the Managing Editor, and that it now appears that the kind of policy questions likely to be referred to the Committee will probably involve special knowledge of editorial and publication problems, it is recommended:

(1) that provision be made to continue the Committee as long as the Board and the Managing Editor find its services mutually helpful, and

(2) that the Board adopt as policy that those designated to serve on the Committee be selected to the extent feasible from among those of its members who have had experience in the editorial field or have a special interest in this aspect of Society activities.

Respectfully submitted,
L. D. NEWSOM
C. B. PHILIP
E. G. LINSLEY, *Chairman*

Governing Board Action

The report was accepted and the recommendations approved.

REPORT OF THE COMMITTEE ON THE INTERNATIONAL CONGRESS

A complete report on the XIth International Congress of Entomology which met in Vienna on August 17–25, 1960 will be printed in the June 1961 BULLETIN. This will be a rather extensive report since the Society had grants totaling $32,500.00 to send entomologists to this Congress, and 41 persons were awarded travel funds.

The XIIth International Congress of Entomology will be held in London, England in August, 1964 at the invitation of the Royal Entomological Society of London.

ENTOMOLOGICAL SOCIETY OF AMERICA—1961

OFFICERS

President.....F. S. ARANT
President-Elect.....ROBERT GLEN
Executive Secretary.....R. H. NELSON

GOVERNING BOARD

F. S. ARANT.....Auburn, Alabama (1962)
R. L. BEARD.....New Haven, Connecticut (B, 1963)
W. J. BROWN.....Ottawa, Ontario (A, 1963)
R. H. DAVIDSON....Columbus, Ohio (North Central, 1963)
ROBERT GLEN.....Ottawa, Ontario (1963)
ROY HANSBERRY....Modesto, California (F, 1961)
M. P. JONES.....Washington, D. C. (1961)
D. R. LINDSAY.....Bethesda, Maryland (D, 1962)
C. M. MEADOWS....Waco, Texas (Southwestern, 1961)
R. H. NELSON.....College Park, Maryland (non-voting)
L. D. NEWSOM.....Baton Rouge, Louisiana (Southeastern, 1962)
C. B. PHILIP.....Hamilton, Montana (Pacific, 1962)
R. W. SHERMAN.....Washington, D. C. (E, 1962)
E. A. STEINHAUS....Berkeley, California (C, 1961)
Neely Turner.....New Haven, Connecticut (Eastern, 1961)

1961 GOVERNING BOARD

ENTOMOLOGICAL SOCIETY OF AMERICA, ATLANTIC CITY, N. J., NOVEMBER 30, 1960.

Left to right, seated: Neely Turner (Eastern Branch), C. M. Meadows (Southwestern Branch), Robert Glen (President-Elect), R. H. Nelson (Executive Secretary), F. S. Arant (President), M. P. Jones (Past President), R. W. Sherman (Section E), C. B. Philip (Pacific Branch). *Standing:* G. J. Haeussler (*vice* E. A. Steinhaus, Section C), Roy Hansberry (Section F), K. L. Knight (*vice* D. R. Lindsay, Section D), R. H. Davidson (North Central Branch), E. G. Lindsley (*vice* W. J. Brown, Section A), R. L. Beard (Section B), L. D. Newsom (Southeastern Branch) and J. E. Bussart (North Central Branch, retiring).

BRANCH OFFICERS

Branch Chairmen

J. McD. Grayson...Blacksburg, Virginia (Eastern)
D. M. De Long.....Columbus, Ohio (North Central)
C. H. York.....Los Angeles, California (Pacific)
C. N. Smith.....Orlando, Florida (Southeastern)
Sherman W. Clark.... Houston, Texas (Southwestern)

Branch Chairmen-Elect

Howard Baker.....Beltsville, Maryland (Eastern)
L. K. Cutkomp.....St. Paul, Minnesota (North Central)
Ray F. Smith.....Berkeley, California (Pacific)
R. J. Kowal.....Asheville, North Carolina (Southeastern)
Manning A. Price.....College Station, Texas (Southwestern)

Branch Secretaries

L. G. Merrill, Jr...New Brunswick, New Jersey (Eastern)
G. E. Guyer.....East Lansing, Michigan (North Central)
H. H. Keifer.....Sacramento, California (Pacific)
J. S. Roussel.....Baton Rouge, Louisiana (Southeastern)
A. C. Gunter.....College Station, Texas (Southwestern)

EDITORIAL BOARDS

Annals of the Entomological Society of America

Lloyd E. Rozeboom, Baltimore, Maryland.....(D, 1965)
P. D. Hurd, Jr., Berkeley, California.....(A, 1964)
Frank N. Young, Jr., Bloomington, Indiana.....(A, 1963)
John J. Pratt, Jr., Wayland, Massachusetts.....(B, 1962)
J. Alfred Adams, *Chairman*, Poughkeepsie, New York.....(C, 1961)

Journal of Economic Entomology

Richard D. O'Brien, Ithaca, New York.....(B, 1965)
Cedric R. Jordan, Athens, Georgia.....(E, 1964)
Ruth L. Busbey, Berwyn, Maryland.....(F, 1963)
Gilbert J. Haeussler, Beltsville, Maryland.....(C, 1962)
Dariel E. Howell, *Chairman*, Stillwater, Oklahoma.....(D, 1961)

Entoma

J. W. Apple, Madison, Wisconsin.....(F, 1965)
George D. Jones, Raleigh, North Carolina.....(E, 1964)
Robert W. Harper, Sacramento, California.....(E, 1963)
Roger W. Roth, Glenview, Illinois.....(F, 1962)
Wm. C. McDuffie, *Chairman*, Beltsville, Maryland.....(D, 1961)

Miscellaneous Publications of the Entomological Society of America

Don W. Micks, Galveston, Texas.....(D, 1965)
Wm. G. Eden, Auburn, Alabama.....(F, 1964)
R. I. Sailer, Beltsville, Maryland.....(A, 1963)
Neely Turner, New Haven, Connecticut.....(B, 1962)
Ray F. Smith, *Chairman*, Berkeley, California.....(C, 1961)

Thomas Say Foundation

G. H. Kaloostian, Fort Valley, Georgia.....(C, 1965)
W. W. Wirth, Washington, D. C.....(A, 1964)
Maurice T. James, Pullman, Washington.....(A, 1963)
Herbert T. Dalmat, Bethesda, Maryland.....(D, 1962)
Leigh E. Chadwick, *Chairman*, Urbana, Illinois.....(B, 1961)

STANDING COMMITTEES

Program Committee

Glenn E. Carman, Riverside, California.....(1963)
Ralph W. Sherman, Washington, D. C.....(1961)
D. O. Wolfenbarger, *Chairman*, Homestead, Florida.....(1962)

Membership Committee

George H. Blake, Jr., Auburn, Alabama.....(1963)
Loyd L. Stitt, Chicago, Illinois.....(1963)
Christian C. Burkhardt, Manhattan, Kansas.....(1962)
George F. Knowlton, Logan, Utah.....(1962)
Allen C. Gunter, Dallas, Texas.....(1961)
James McD. Grayson, *Chairman*, Blacksburg, Virginia.....(1961)

Committee on Entomological Nomenclature

Richard M. Bohart, Davis, California.....(1963)
D. Elmo Hardy, Honolulu, Hawaii.....(1963)
C. B. Philip, Hamilton, Montana.....(1963)
Willis J. Gertsch, New York, New York.....(1962)
Paul O. Ritcher, Corvallis, Oregon.....(1962)
Rupert L. Wenzel, Chicago, Illinois.....(1962)
George P. Holland, Ottawa, Ontario.....(1961)
Robert L. Usinger, Berkeley, California.....(1961)
Curtis W. Sabrosky, *Chairman*, Washington, D. C.....(1961)

Committee on Common Names of Insects

Walter Ebeling, Los Angeles, California.....(1963)
John H. Lilly, Amherst, Massachusetts.....(1963)
Ashley B. Gurney, Washington, D. C.....(1962)
Henry F. Howden, Ottawa, Ontario.....(1962)
Stephen L. Wood, Provo, Utah.....(1962)
W. J. Brown, Ottawa, Ontario.....(1961)
Howard E. Evans, Ithaca, New York.....(1961)
Floyd D. Miner, Fayetteville, Arkansas.....(1961)
J. L. Laffoon, *Chairman*, Ames, Iowa.....(1963)

Committee on Insecticide Terminology

Henry Hurtig, Ottawa, Ontario.....(1963)
Samuel C. Billings, Silver Spring, Maryland.....(1963)
James E. Brogdon, Gainesville, Florida.....(1962)
J. Everett Bussart, Wheaton, Illinois.....(1962)
Ralph B. March, Riverside, California.....(1961)
Carroll N. Smith, *Chairman*, Orlando, Florida.....(1961)

Committee on Insecticide Reference Standards

James G. Sternburg, Urbana, Illinois.....(1964)
A. J. Forgash, New Brunswick, New Jersey.....(1963)
Rosmarie von Rumker, Kansas City, Missouri.....(1962)
Lynn H. Dawsey, *Chairman*, Tifton, Georgia.....(1961)

Committee on Insect Surveys and Losses

Leo G. K. Iverson, Arlington, Virginia.....(1964)
Wm. A. Simanton, Lake Alfred, Florida.....(1964)
John H. Hughes, Washington, D. C.....(1963)
Herbert Knutson, Manhattan, Kansas.....(1963)
Elmer W. Beck, Tifton, Georgia.....(1962)
O. H. Hammer, Midland, Michigan.....(1962)
Robert L. Furniss, Portland, Oregon.....(1961)
James N. Roney, *Chairman* Phoenix, Arizona.....(1961)
William H. Anderson, *Ex Officio*, Washington, D. C.
Kelvin Dorward, *Ex Officio*, Vienna, Virginia
Richard T. Holway, *Ex Officio*, Washington, D. C.

Committee on Finance

George L. Hutton, Bethesda, Maryland.....(1963)
H. G. Johnston, Memphis, Tennessee.....(1962)
John V. Osmun, *Chairman*, Lafayette, Indiana.....(1961)

Committee on Professional Training, Standards, and Status

William G. Eden, Auburn, Alabama.....(1963)
Paul O. Ritcher, Corvallis, Oregon.....(1963)
George G. Gyrisco, Ithaca, New York.....(1962)
Charles D. Michener, Lawrence, Kansas.....(1962)
Dale R. Lindsay, Bethesda, Maryland.....(1961)
Ralph E. Heal, *Chairman*, Elizabeth, New Jersey.....(1961)

Committee on Memorial Lectures

D. O. Wolfenbarger, Homestead, Florida.....(1963)
L. D. Newsom, Baton Rouge, Louisiana.....(1962)
E. A. Steinhaus, Berkeley, California.....(1962)
Ralph W. Sherman, Washington, D. C.....(1961)
B. N. Smallman, *Chairman*, Ottawa, Ontario.....(1961)

Committee on Public Information

M. R. Budd, Wilmington, Delaware.....(1964)
Roy G. Richmond, Washington, D. C.....(1963)
Harold Gunderson, Ames, Iowa.....(1962)
Bailey B. Pepper, New Brunswick, New Jersey.....(1961)
David G. Hall, *Chairman*, Washington, D. C.....(1965)

SOCIETY REPRESENTATIVES

Representative to the American Grasslands Council

B. A. App, Beltsville, Maryland.....1960–1962

Representative on National Cattle Grub Committee

D. E. Howell, Stillwater, Oklahoma.....1960–1962

Representative on the AAAS-Campbell Award Committee for Vegetable Research

F. F. Smith, Beltsville, Maryland.....1960–1962

Representative to the National Research Council, Division of Biology and Agriculture

W. H. Anderson, Washington, D. C.....1959–1962

Representative on the Governing Board of the American Institute of Biological Sciences

F. W. Poos, Arlington, Virginia.....1959–1962

Representative to the Agricultural Research Institute, Agricultural Board

H. H. Shepard, Washington, D. C.....1959–1961

Representative on the PreTreaT Board of the National Pest Control Association

John V. Osmun, Lafayette, Indiana.....1961–1962

Representative on the Agricultural Chemicals Application Committee of the American Society of Agricultural Engineers

J. Everett Bussart, Wheaton, Illinois.....1961

Representative on the Council of the American Association for the Advancement of Science

Gordon Alexander, Boulder, Colorado.....1960–1961

SECTION AND SUB-SECTION OFFICERS

A. General Entomology

Lewis Berner, *Chairman*, Gainesville, Florida
O. I. Snapp, *Vice-Chairman*, Fort Valley, Georgia
H. V. Weems, Jr., *Secretary*, Gainesville, Florida

Sub-Section b, Teaching

W. R. Enns, *Chairman*, Columbia, Missouri
Floyd G. Werner, *Vice Chairman*, Tucson, Arizona
W. Wayne Boyle, *Secretary*, University Park, Pennsylvania

B. Insect Physiology and Toxicology

Murray S. Blum, *Chairman*, Baton Rouge, Louisiana
Daniel L. Shankland, *Vice-Chairman*, Lafayette, Indiana
Herbert H. Moorefield, *Secretary*, Clayton, North Carolina

C. Insect Biology

Walter C. Rothenbuhler, *Chairman*, Ames, Iowa
F. L. McEwen, *Vice-Chairman*, Geneva, New York
J. D. Briggs, *Secretary*, Wasco, California

Sub-Section a, Biological Control

Irvin M. Hall, *Chairman*, Riverside, California
Paul H. Dunn, *Secretary*, San Jacinto, California

Sub-Section b, Apiculture

T. S. K. Johannson, *Chairman*, Flushing, New York
Norman E. Gary, *Secretary*, Ithaca, New York

Sub-Section c, Insect Vectors of Plant Diseases

J. N. Simons, *Chairman*, South Pasadena, California
Orin A. Hills, *Vice-Chairman*, Mesa, Arizona
Knud G. Swenson, *Secretary*, Corvallis, Oregon

Sub-Section d, Ecology and Bionomics

F. R. Lawson, *Chairman*, Oxford, North Carolina
J. A. Adams, *Vice-Chairman*, Poughkeepsie, New York
J. D. Paschke, *Secretary*, Lafayette, Indiana

D. Medical and Veterinary Entomology

George Hutton, *Chairman*, Bethesda, Maryland
Cluff E. Hopla, *Vice-Chairman*, Norman, Oklahoma
Wm. M. Rogoff, Secretary, Brookings, South Dakota

E. Control, Extension and Regulatory Entomology

C. R. Jordan, Jr., *Chairman*, Athens, Georgia
E. D. Burgess, *Vice-Chairman*, Arlington, Virginia
L. G. Davis, *Secretary*, Vienna, Virginia

Sub-Section a, Extension

A. G. Bennett, *Chairman*, State College, Mississippi
G. F. Knowlton, *Vice-Chairman*, Logan, Utah
J. E. Brogdon, *Secretary*, Gainesville, Florida

Sub-Section b, Plant Pest Control and Quarantine

W. E. Blasingame, *Chairman*, Atlanta, Georgia
R. W. Harper, *Vice-Chairman*, Sacramento, California
G. G. Rohwer, *Secretary*, Medford Lakes, New Jersey

F. Chemical Control Investigations

M. M. Barnes, *Chairman*, Riverside, California
Roy Hansberry, *Vice-Chairman*, Modesto, California
R. W. Rings, *Secretary*, Wooster, Ohio

MEMBERS IN THE NEWS

L. L. Pechuman of the California Spray Chemical Company was honored last September by being awarded an Honorary Membership in the Rochester, N. Y. Academy of Science in recognition of his work as an entomologist. He was also given an Award of Citation by the University of Buffalo at the dedication of the University's Health Science Building.

Joseph W. Gentry of the U.S.D.A. was sent to Tunisia last October to assist in the development and organization of work on insect survey and detection programs in the Middle East, Asia and Africa.

Vincent G. Dethier of the University of Pennsylvania represented the Entomological Society of America at the dedication and housewarming of the new *Biological Abstracts* building in Philadelphia on October 6 and 7, 1960.

William I. Elo of San Antonio, Texas, and T. Roy Young of Tampa, Florida are among the Regional Vice-Presidents of the National Pest Control Association elected last fall to serve through their 1962 convention. Among new Directors elected at the same time were J. V. Benschoter of Toledo, Ohio, L. E. Chambers of Virginia Beach, Virginia, Herman Ratner of Atlantic City, N. J., R. R. Schendel of Topeka, Kansas, K. W. Tompkins of New York, N. Y., and Lee C. Truman of Indianapolis, Indiana. At the October 17–20, 1960 Tulsa Convention of the N.P.C.A. Maurice Oser was elected President and P. K. Adams, Secretary-Treasurer. On the new Executive Board are President Oser, Chairman, Past President Harold Schnorrenberg, L. C. Truman and W. I. Elo. E.S.A. Honorary Member J. J. Davis attended the convention and sent a report to the Bulletin Editor. E. J. Gerberg of Baltimore, Maryland, presided at a meeting of Pi Chi Omega. Myron W. Smith of Memphis, Tennessee, was elected Secretary-Treasurer of this Pest Control Operators fraternity.

Three new U.S.D.A. Entomology Research Division laboratories will be completed by about July 1961. T. B. Davich was named Director of the Boll Weevil Research Laboratory at State College, Mississippi, Wayne L. Howe was appointed Director of the Northern Grain Insects Laboratory at Brookings, South Dakota, and H. C. Cox was designated as Director of the Southern Grain Insects Laboratory at Tifton, Georgia.

H. L. Parker of Nice, France, recently retired from the U.S.D.A. Entomology Research Division after 45

years of service. REECE I. SAILER was named to replace Dr. Parker at the U.S.D.A. laboratory in France.

The Roy E. Campbell Residence Hall for men will be the name of a new men's dormitory at Whittier College, Whittier, California. This is in honor of ROY E. CAMPBELL, 1960 U.S.D.A. retiree, who plans to endow a Chair of Entomology at the College.

L. F. STEINER was named the first winner of the Florida Entomological Society's honor award. This was given at their 1960 annual meeting in recognition of Mr. Steiner's work in the eradication of the Mediterrainean fruit fly in Florida.

ROBERT GLEN, Director General, Research Branch, Canada Department of Agriculture and President-Elect of the Entomological Society of America, was awarded an Honorary D.Sc. by the University of Ottawa. HENRY HURTIG, Associate Director of Program, Pesticides Branch of the Department was awarded the Centennial Medal of the Institute Agronomique de l'Etat Belgique.

S. B. FRACKER received the 1960 OPEDA (Organization of Professional Employees of the Department of Agriculture) Award. The award is given annually to the organization member who has contributed most to fulfilling the purpose of the group's Code of Ethics.

H. S. TELFORD, Chairman of the Department of Entomology at Washington State University left February 15 for a six-months, sabbatical tour of western Europe. He will visit the principal entomology laboratories and departments. L. W. GETZIN joined the entomology staff at Washington State on January 1.

KNUD G. SWENSON, Department of Entomology at Oregon State College received a Gugenheim Fellowship and is spending a year, starting last August, working on virus vector problems at the C.S.I.R.O. in Canberra, Australia. C. H. MARTIN of the same Department has an N.S.F. grant for the study of Asilidae. He is spending considerable time in Mexico. W. P. STEPHEN got a cash award of $200.00 from the Oregon Agricultural Experiment Station for his contributions on the colonization of the alkali bee. S. C. JONES and L. G. GENTNER received Oregon Farm Bureau awards last November in recognition of 30 years service to agriculture.

A. O. FOSTER was named director of the U.S.D.A. Parasitological Research Laboratories at Beltsville, Maryland last October.

E. J. DUDA was appointed acting director of the Bartlett Tree Research Laboratories in Stamford, Connecticut.

P. J. RENO of the Hercules Powder Company spoke on the proper use of pesticides at the 13th Annual Pesticide School at North Carolina State College in Raleigh on January 10.

M. W. CHOATE of the California Chemical Company in San Jose, California, announced the appointment of J. P. GOODE as field research entomologist for the Ortho Division in Salinas.

C. A. WEIGEL of Silver Spring, Maryland, retired U.S.D.A. entomologist, received a nice write-up in *the New Hampshire Alumnus* for June 1960. Dr. Weigel graduated from New Hampshire in 1916. He was a student of Honorary Member W. C. O'KANE.

H. H. WALKDEN, Head, Stored Grain Insects Laboratory, U.S.D.A., Manhattan, Kansas, retired after 40 years of service. GAILEN D. WHITE follows him as head of the laboratory.

MORRIS ROCKSTEIN, past member of the Governing Board served as one of the four biological scientists at the Jan. 8–12, 1961, President's White House Conference on Aging. He was Recorder of the Work Group concerned with Biological Aspects of Aging and was one of the 270 voting delegates out of about 2700 participants.

REGINALD H. PAINTER of Kansas State University received an honorary LL.D. from the University of Arkansas on January 28, 1961. This was in recognition of his entomological achievements.

C. W. SABROSKY of the U.S.D.A. in Washington, D. C., was made a member of the *Permanent Committee for International Congresses of Entomology* at the Vienna Congress. He replaces J. CHESTER BRADLEY.

STYLE MANUAL FOR BIOLOGICAL JOURNALS

This 92-page Manual was prepared by the Committee on Form and Style of the Conference of Biological Editors and was published in December 1960 by the American Institute of Biological Sciences, 2000 P Street, N.W., Washington 6, D. C., to which all orders should be addressed. Price $3.00.

This Manual is designed for research workers preparing manuscripts for publication in biological journals, and for students and other prospective authors. Style is interpreted broadly to mean forms of expression in scholarly writing, and the general technical requirements of journals, such as details for typing manuscripts, standard abbreviations, and citation of references.

Before preparing this Manual the Committee reviewed various style manuals and "Instruction to Authors" and concluded that existing manuals are either too long and difficult to use, or too short and lack substance. Therefore, a manual of moderate size and coverage was prepared with the hope that it would be practical and useful, especially to young biologists. Good usage and accepted practices are recommended and, if followed, they will establish high standards in biological publication.

In the preface are listed 76 journals that have adopted this Manual in whole or in part. In the interests of obtaining greater uniformity, permission was granted the Committee to include four of our Society's journals in this list although it seems doubtful that there will ever be uniform editorial policy among journals in biological disciplines for various reasons.

Members of the Governing Board's Committee on Publication Policies, and also others interested in continual improvement in our Society's publications, have generously contributed time to study this Manual carefully and to give me their individual opinions of it. On the whole the comments received were favorable, all recommending the *Style Manual for Biological Journals* as a very useful aid. There are a few places where sentences in the text do not bear out admonitions about terse straightforward style, contrary to advice of the Manual. Unfortunately, on page 19, item 6, two incorrect examples of insect names that should be set solid are given. Bed bug and house fly should never be set solid. Desirable changes will undoubtedly be made in the first revision. Comments are solicited in the preface which states that if this Manual is to be useful, it must be kept up to date by frequent revision.

Many objections to the list of abbreviations (Words Used in Citations, pp. 65–70) were raised by our reviewers. Therefore, our Society will not adopt the use of these abbreviations at this time. It is recommended, instead, that the abbreviations used by Biological Abstracts (Vol. 35, No. 20, October 15, 1960) be used in our Society's publications as in the past. Many of our members like the present style and form of our Society's publications very much and do not favor adopting changes unless obvious improvement is made. Certainly no extensive changes should be made all at once but improvements should be sought unceasingly. There is much to commend the Manual without subscribing to the tenet of regimented style in the preparation of manuscripts for publication in our Society's journals.

F. W. Poos

PROCEEDINGS OF THE PACIFIC BRANCH OF THE ENTOMOLOGICAL SOCIETY OF AMERICA

Spokane, Washington, June 27–30, 1960

Preliminary Business Meeting

H. C. Manis opened the Preliminary Business Session of the Pacific Branch in the Davenport Hotel at 11 a.m. on June 28. Mayor Fossine of Spokane greeted the members of the Branch.

E. H. Littooy, retiring Pacific Branch Representative to the Society Governing Board, presented his report to the Branch. He stated it had been a rewarding privilege to be on the Governing Board, and noted the long hours spent by the Board at each annual meeting in transacting the necessary business. The Pacific Branch now has four members on the Board. Littooy pointed out that the Society now has a new headquarters building at College Park, Maryland, costing $37,500.00. He also noted that a Pacific Branch member, E. A. Steinhaus, had presented last year's C. V. Riley Memorial Address; and that our new Branch Representative, C. B. Philip, of Hamilton, Montana, was not only well known to us but had received a gold medal for Entomological accomplishment from the University of Minnesota.

The Executive Secretary of the Society, R. H. Nelson, made a few remarks.

C. H. York, Chairman-Elect of the Branch, announced that the 1961 Branch meetings would be at the Miramar Hotel in Santa Barbara, June 19 through June 22. He also announced that the Pacific Branch would place Walter Carter of the Hawaiian Pineapple Institute in nomination as President-Elect of the Society.

C. O. Persing presented the report of the Branch *Publications Committee.* This committee had met January 19 at the Portland Hotel, and Dr. Persing submitted a report by this committee favoring a limited publication of abstracts by the Pacific Branch. He stated that copies of this report would be available on the registration desk for anyone interested, and that the report would be voted upon at the Annual Business Meeting on the afternoon of June 30.

The Secretary announced that a new constitution for the Branch had been approved by the *Executive Committee,* that this constitution would be printed and distributed to all members of the Branch in the envelope containing the preliminary announcements of the 1961 Branch meetings, and that the new constitution would be voted upon at the annual meeting at Santa Barbara in June 1961.

The Secretary-Treasurer presented the Branch financial report, which was handed to the Chairman of the *Auditing Committee,* R. E. Jones.

June 19, 1959, old balance	**$ 897.00**
1959–60 income	1,146.00
1959–60 expenses	558.29
June 22, new balance	**$1,485.04**

The Society is endeavoring to reduce the indebtedness on its new headquarters building at College Park, Maryland, by soliciting donations from all Society members directly to headquarters. Since the Society is a non-profit organization, these donations are deductable from income tax. R. H. Nelson stated that the Society had borrowed money from its permanent fund in the amount of $24,000, and that the Governing Board had approved forms which will be mailed to each Society member, requesting individual donations to pay off its indebtedness. C. O. Barnard of the Western Agricultural Chemicals Association supported the idea that all members of the Society should participate in contributing to the payment of this debt. R. E. Campbell moved that the Pacific Branch endorse the proposed individual contributions from Society members to the building fund, and that the Branch urge all members to contribute. C. O. Barnard seconded the motion, which carried.

C. B. Philip, Branch Representative to the Governing Board, suggested that the Society, following the lead of other branches of science, establish certificates of merit to high school students and high school teachers who had made significant contributions to entomology. He further suggested that the Pacific Branch present a resolution to the Society suggesting that the Society automatically incorporate the Membership Chairman of the branches into the Society Membership Committee.

Executive Committee

The Executive Committee met in Chairman H. C. Manis' suite on the evening of June 27.

Chairman Manis called the meeting to order at 8 p.m. Members present: H. C. Manis, C. H. York, C. B. Philip, H. H. Keifer, H. S. Telford, A. E. Michelbacher, R. W. Harper, G. F. Knowlton. Members absent: L. M. Smith, R. B. March, H. C. Lewis.

Guests: M. P. Jones, President of the Society, and members of the *Publications Committee,* M. M. Barnes and C. O. Persing, *Chairman.*

The minutes of the June 1959 meeting of the *Executive Committee* were approved as read. C. B. Philip, Representative to the Governing Board from the Branch, stated that he had met with the new Governing Board under M. P. Jones at the end of the Detroit meetings of the Society, December 1959.

President M. P. Jones followed with a few remarks concerning the importance of the branchs to the Society and his pleasure at being at the Pacific Branch meetings.

There was a discussion concerning possible meeting sites of the 1962 Branch meetings in the general San Francisco Bay area. The Secretary read a letter from the Whitcomb Hotel in San Francisco. There was also a suggestion that perhaps the Branch could meet on the University Campus but certain disadvantages to this type of location were pointed out. Chairman York moved that the *Executive Committee* instruct the next Chairman-Elect to begin immediately to look for a site for the 1962 meetings of the Branch, preferably in the San Francisco Bay region, and to report the results of his search to the Executive Committee meeting in 1961. G. F. Knowlton seconded the motion, which carried.

The next order of business was a report by the Branch *Publications Committee.* C. O. Persing had been designated *Chairman* of this committee by H. C. Manis, and he presented the committee report. He stated that the committee had met in Portland, January 19, 1960, and he distributed copies of the committee report. There was considerable discussion concerning the wording of the report, and the final form of the report is:

The Committee met for the purpose of considering certain improvements in the quality of exchange of information at our annual Pacific Branch Meeting. The following recommendations are made:

Recommendations:

1. The present practice of printing and distributing the program will be continued with the exception that the program will not contain abstracts of the papers.
2. A separate booklet consisting of abstracts of the papers will be printed and be made available to the members prior to the meeting. The following details concerning these abstracts were considered and the following recommendations are made:
   a. The length of the abstracts of regular papers is not to exceed 600 words, and Invitational papers

not to exceed 1,000 words. No tables or graphs will be accepted.

b. The abstract editor will be appointed by the Branch Chairman on advice of the Executive Committee.

c. Cost of printing and distribution of the abstract booklets will be covered by direct sale. Charge for copies will be determined by the Executive Committee.

d. The abstract booklet will carry the heading "Not for Publication." This will make certain that the abstract booklet is not intended to be an official publication.

e. Abstracts will be solicited from all participants in the program.

f. This procedure will be effected in 1961.

The Secretary then moved that the *Executive Committee* approve the report of the *Publications Committee* as corrected, present it to the annual meeting for a vote; and if this report is adopted at the annual meeting, that the *Executive Committee*, through the Branch Chairman, appoint an Editor for these publications for a standard three-year term; and execute a three-year agreement with this Editor concerning the various arrangements in connection with the publication; that this Editor be reappointable for a new term at the end of each three years, and that the agreement be renegotiable either "as is" or with changes specified by the *Executive Committee* at the end of each three years. C. B. Philip seconded the motion, which carried.

The next order of business was consideration of the proposed Branch Constitution. The Secretary, who was Chairman of the new Branch *Constitution Committee*, then presented the proposed constitution and moved that it be accepted by the *Executive Committee*; that it be printed and mailed to all members of the Branch with the preliminary announcements in February or March of 1961, and that it be brought to a vote at the annual meeting of the Branch in 1961. C. B. Philip seconded the motion. There followed a reading of this proposed constitution, section by section, and, after the wording had been agreed upon, the committee passed the motion.

The Chairman presented a letter from President-Elect H. M. Harris, inquiring about a possible Branch committee on losses caused by insects. There was some discussion on the subject, during which H. S. Telford suggested they investigate the actions of former Branch committees on insect losses and President M. P. Jones of the Society supported the importance of the Branch having a committee on the subject. G. F. Knowlton moved that the Branch set up a committee along the lines of the Society committee on insect crop damage estimates and surveys. R. W. Harper seconded the motion, which passed.

Dr. Manis presented a letter from J. E. Bussart, Chairman of the North Central States Branch of the *Committee on Sustaining Associates*, asking about the status of *Sustaining Associates Committee* in the Pacific Branch. G. F. Knowlton moved to refer the matter of establishing a *Sustaining Associates Committee* in the Pacific Branch to the new Branch Chairman, with power to act on this committee at his own discretion. C. B. Philip seconded the motion, which passed.

Annual Meeting

Chairman H. C. Manis of the Pacific Branch opened the Annual Meeting in the Elizabethan Room of the Davenport Hotel at 1:40 p.m., Thursday, June 30.

The *Auditing Committee* Chairman, Robert E. Jones, reported that the Branch accounts were in order.

The *Membership Committee* Chairman submitted the following report:

Total number of members, June 1959	1,102
1959–60 gains—new members, reinstatements, transfers	186
1959–60 losses—resignations, transfers, deaths	177
Net Gain	9
Total number of members, June, 1960	1,111

Respectfully submitted
LOUIS G. GENTNER
Chairman

Martin M. Barnes, member of the *Publications Committee*, then presented the report from this *Publications Committee*, stating that the *Publications Committee* wanted to act in harmony with the wishes of the majority of the Branch members. He discussed the various features of this report, and moved that the report be accepted by the Branch. L. A. Riehl seconded the motion. There were a number of questions from the members, and considerable discussion, but in the end the motion was carried.

C. R. Amen, Chairman of the *Resolutions Committee*, presented the following resolutions.

Resolutions

1. *Whereas*, the Pacific Branch of the Entomological Society of America has lost through death several members since its last meeting,

Be It Resolved that the Pacific Branch extend condolences to the bereaved families of the following deceased members and that the secretary be instructed to so communicate these condolences:

E. F. Bashor	A. P. Sturtevant
P. F. Bonhag	O. H. Swezey
E. C. Clark	M. A. Vogel
W. W. Yates	W. S. Regan

2. *Whereas*, the various Chairmen and members of their committees have commendably fulfilled their tasks to provide a most successful meeting,

Be It Resolved that the Pacific Branch express its thanks to the *Program Committee, Registration Committee, Operations Committee, Membership Committee, Nominations Committee, Publicity Committee, Auditing Committee* and *Publications Committee.*

3. *Whereas*, the Davenport Hotel management and personnel have untiringly assisted various committees and contributed greatly to a highly successful meeting,

Be It Resolved that the Secretary be instructed to write a letter of thanks to the Davenport Hotel.

4. *Whereas*, the Spokane newspapers—*Spokane-Review* and *Spokane Daily Chronicle*—have done an excellent job in favorably publicizing these meetings,

Be It Resolved that the Secretary be instructed to write a letter of thanks for this news coverage to the Editors of the *Spokane-Review* and *Spokane Daily Chronicle.*

5. *Whereas*, the final session of the annual business meeting of the Pacific Branch of the Entomological Society of America is held in the afternoon of the final meeting day; and

Whereas, intercity and interstate transportation schedules do not permit a large number of members attending the Branch meetings to be present at the final business session,

Be It Resolved that the final business session of future Branch meetings be programmed as the first item on the morning of the last meeting day.

6. *Whereas*, the Governing Board of the Parent Society has gone on record as favoring occasional joint meetings with other A.I.B.S. societies, and

Whereas it is understood that the A.I.B.S. also favors this,

Be It Resolved that the Pacific Branch actively seek such meetings in the West through the appropriate officers and committees of the Branch, and in cooperation with the E.S.A. Committee on Joint Meetings.

7. Resolution number 7 was rejected by vote of the members present. H. M. Armitage moved that the contents of resolution number 7 be submitted to F. W. Poos for his information, but the motion was ruled out of order, in view of the fact that the resolution had been rejected.

8. *Whereas* various professional disciplines are recognizing the merit of promotion of interest in pertinent science activities of National competitive programs at the secondary school level at State and National Talent Search Contests, Science Fairs, 4-H Programs and the like, and

Whereas some outstanding exhibits with an entomological theme are often provided at such functions, for example, an ingenious study of an ant community won the Boys' Division of the Montana State Science Fair award in 1958, and

Whereas such organizations as the Committee on Education of the Society of American Bacteriologists are awarding certificates of merit to winners of high school exhibits in their discipline, and

Whereas E.S.A. has been recognizing meritorious work among the National 4-H Clubs,

Be It Resolved that the Governing Board of E.S.A., through the appropriate Committee, promote similar expanded recognition through respective Branches of seeking out suitable high school candidates for an award of a certificate of merit in Entomology for appropriate exhibits or activities.

9. *Whereas* the growth of the Society depends on the acquisition of new members, and

Whereas the membership effort of the Society will be much better organized if all Branch Membership Chairmen are automatically incorporated into the Society Membership Committee,

Be It Resolved that the Pacific Branch go on record as favoring the adoption by the Parent Society of measures making it possible for the Society to automatically incorporate all Branch Membership Chairmen into the Society *Membership Committee*, and that the respective Branch Chairmen, upon assuming office, notify the Society President of their respective Membership Chairmen, and that the terms of the Branch Membership Chairmen within the branches be not changed by fiscal considerations of the Society.

10. *Whereas:* "The Summary of Certain Pesticide Chemical Uses" has been far the best guide for acceptable pesticide uses, and

Whereas, the complexity of pesticide uses in such a manner to avoid contamination of food and forage and the number of available pesticides have created a need for a guide to acceptable uses of pesticides, and

Whereas, such a guide is of inestimable value to the Agricultural Chemical Industry, State and Federal Enforcement Agencies, State Experiment Stations, Research personnel and Research agencies, Agricultural Extension, food processors, growers and grower organizations,

Be It Resolved that the United States Department of Agriculture be urged to revise, expand and bring up-to-date "The Summary of Certain Pesticide Uses" and to send out the new pesticide uses promptly and at weekly intervals if possible, and

Be It Further Resolved that the new pesticide uses be sent on single sheets of paper or that entire pages be revised and the provision be made so that the use lists may be checked for completeness, and

Be It Further Resolved that copies of this resolution be submitted to Byron T. Shaw, Administrator of A.R.S., and C. M. Ferguson, Administrator, Federal Extension Service, U.S.D.A., Washington 25, D. C.

11. *Whereas*, recent restrictions and regulations governing the uses of pesticides and the interpretations pertaining thereto have resulted in considerable confusion in making insect pest control recommendations,

Whereas, this confusion is likely to continue unabated until a better appreciation of problems concerned with insect control exists between all elements concerned,

Whereas, the elements concerned in the overall intricate problem of insect pest control include Agricultural Chemists, Chemical Companies, H.E.W., Federal, State and Extension Entomologists, Food Processors, Buyers and Agricultural Commodity Agencies, the Pesticide Regulation Branch of the U.S.D.A., and the United States Public Health Service.

Whereas, leadership for correcting undesirable conditions should be assumed by Entomologists,

Be It Resolved that the Pacific Branch of the Entomological Society of America goes on record as favoring the establishment of a standing coordinating committee composed of representatives of the above mentioned elements; this committee to review situations which bring about existing confusion and take necessary steps to resolve the problems,

Be It Further Resolved that this resolution be submitted to the Governing Board of the Entomological Society of America with instructions to take the steps it deems necessary to have such a committee formed.

12. *Whereas* the President's Advisory Committee, also known as the 'Kistiakowsky Committee', has rendered a report believed to be in the best interests of professional Entomology,

Be It Resolved that the Pacific Branch of E.S.A. endorse their report, specifically its recommendations calling for (1) the appointment of a scientifically qualified advisory committee to the Secretary of H.E.W., (2) the use of scientific judgment in administering the provisions of the Delaney Clause of the Food Additive Amendment to the Food, Drug and Cosmetic Act, or a revision of the Act if this is not considered permissive within the framework of the present Amendment, (3) that additional basic research be done on low levels of carcinogens, and (4) research be expanded to discover additional safe and effective materials for the production and processing of foods, and

Be It Further Resolved that the Secretary of the Pacific Branch send a copy of this resolution to the office of the President of the United States.

The Chairman of the *Resolutions Committee* read each resolution and moved that it be accepted. All were seconded and all except resolution number 7 carried.

E. H. Littooy, *Chairman* of the *Nominating Committee*, placed the name of Ray F. Smith in nomination for Chairman-Elect of the Branch. C. H. York moved that the Branch accept the report, close the nominations, and that the Secretary be instructed to cast a unanimous ballot for Ray F. Smith. The motion was seconded and carried.

The next order of business was the election of two new active members to the *Executive Committee*. R. E. Campbell nominated A. F. Kirkpatrick. W. C. Cook nominated Sydney C. Jones. T. O. Tuft nominated C. O. Persing. The Chairman appointed an *Election Committee* consisting of R. W. Portman, R. W. Every, and Philip C. Johnson. T. R. Hansbury moved that the nominations be closed. R. E. Campbell seconded the motion, which carried. Portman reported later that A. F. Kirkpatrick and Sydney C. Jones had been elected.

R. F. Kirkpatrick then moved that the Secretary be instructed to write a letter to all members of the Branch advising them that the Branch supports the request by the Society for donations from Society members directly to Society headquarters to help pay the indebtedness incurred by the Society in the purchase of the new headquarters building, this letter to indicate that it is the recommendation of the Branch members at the annual meeting that all Branch members contribute. The motion was seconded and adopted.

H. M. Armitage moved that, in view of the fact that (1) ESA has need of reducing obligations incurred in the purchase of a headquarters (2) that the Pacific Branch does not have any such fixed obligations, (3) that a running

balance of $1,000 should be adequate to meet any Branch contingencies either contemplated or otherwise, (4) that the Pacific Branch instruct the Secretary to remit to ESA all moneys in the Branch Treasury in excess of $1,000—up to $500—earmarked to be applied at the earliest possible time against the principal of the headquarters mortgage. After some discussion, the motion was defeated.

H. M. Armitage called attention to the forthcoming nomination of Walter Carter of the Pineapple Institute for President-Elect of the Society, and urged that all members of the Branch support this nomination.

H. C. Manis then took the chair as retiring Branch Chairman and thanked all his appointees and those present for the help that they had given him in the work of the Branch during the year and in the preparation of the annual convention. He then turned the gavel over to the new Chairman, C. H. York.

As there was no further business, Chairman York adjourned the meeting for a short recess, to be followed by the final paper-reading session. There were 245 registrations.

Respectfully submitted,
H. H. KEIFER, *Secretary*

NEW PUBLICATIONS

DICTIONARY OF WORD ROOTS AND COMBINING FORMS, by Donald J. Borror. N-P Publications, Palo Alto, California. 1960. 5 x 7 inches, 134 pp. Price $2.00.

This very useful dictionary has been designed primarily to meet the needs of the beginning student, the medical student, and the taxonomist, but it should be of value to all biologists in understanding technical terms because it was compiled from the Greek, Latin, and other languages, with special reference to biological terms and scientific names.

HANDBOOK ON BIOLOGICAL CONTROL OF PLANT PESTS, a special printing of Plants & Gardens, Vol. 16, No. 3, 97 pp., available for one dollar from the Brooklyn Botanic Garden, Brooklyn 25, N. Y.

In this handbook, which is exceptionally well illustrated, the present status of the several methods of controlling insect pests (excluding chemical) is summarized in 16 chapters contributed by well-qualified authors. Not only is interesting news about programs with insect parasites and predators included but also a chapter on each of the following: microbial insecticides, nematode enemies, use of resistant varieties, eradication by means of sterilized males, birds and insect control. Some of the authors give objective views on the potentialities of these methods.

GUIDE TO THE INSECTS OF CONNECTICUT. PART VI. THE DIPTERA OR TRUE FLIES OF CONNECTICUT. Seventh Fascicle. Psychodidae, by Laurence W. Quate. Bulletin No. 92 State Geological and Natural History Survey of Connecticut. v + 54 pp. December, 1960. Price not stated. Distribution by the Librarian, State Library, Hartford, Conn.

This bulletin includes keys to the genera of North America and higher taxa of the world. Therefore the usefulness is not as parochial as the general title suggests.

BLACK FLY BIBLIOGRAPHY, from references supplied by Charles A. Weigel, U. S. Dept. Agric. (retired) and Charles W. McComb, Univ. of Md. 29 pp. mimeographed November, 1960. Issued by the Office of the State Entomologist, Univ. of Md., State Board of Agriculture, College Park, Md.

TRICHOPTERORUM CATALOGUS. Volume 1, Necrotaulidae, Prosepididontidae, Rhyacophilidae. In press. By F. C. J. Fischer. This catalogue when complete will contain about eight volumes. Volume 1 will be about 175 pages. Normally printed $9.00, printed on one side only $9.50. Order from the Netherlands Entomological Society, 21 Zeeburgerdijk, Amsterdam, Holland.

SOME VENOMOUS AND NOXIOUS ANIMALS OF THE FAR EAST. 1960. By Lt. Col. Hugh L. Keegan. For further information write the Army Medical Service School, Fort Sam Houston, Texas.

THIRD ANNUAL REPORT OF THE ARMED FORCES PEST CONTROL BOARD. 1960. For further information write Richard T. Holway, Captain MSC, USN, *Executive Secretary*, Armed Forces Pest Control Board, Forest Glen Section, WRAMC, Washington 12, D. C.

DUES AND MEMBERSHIP IN SCIENTIFIC SOCIETIES. 1960. National Science Foundation, NSF-60-55. Office of Science Information Service, 1951 Constitution Ave., N.W., Washington 25, D. C

OFFICIAL FDA TOLERANCES. Complete through December 1, 1960. Special issue of *N.A.C.A. News and Pesticide Review*. For further information write Dennis Hayley, Editor, N.A.C.A., 1145 19th St., N.W., Washington 6, D. C.

BOOK REVIEWS

REPORT OF THE SEVENTH COMMONWEALTH ENTOMOLOGICAL CONFERENCE, JULY 6–15, 1960. Super Royal 8vo. 399 pp. Paper covers, 50 shillings, postpaid. Commonwealth Institute of Entomology, 56 Queen's Gate, London, S.W. 7.

This is a detailed account of the Conference together with the conclusions and resolutions arising from it, and appendices dealing with the work of the Commonwealth Institute of Entomology and the Commonwealth Institute of Biological Control. Included in the Report are 47 Reviews of Work in Economic Entomology from almost all parts of the Commonwealth. These give a comprehensive picture of the developments that have taken place in economic entomology in the various countries, 1954–59. The topics deal with organization and staffing, and work on insects and mites affecting agricultural and horticultural crops, forests and forest products, stored products, and man and stock, as well as quarantine and centralized research.

The papers given are printed in full, together with summaries of the discussions that ensued. The subjects discussed, and the opening speakers, were as follows:

Recent Developments in Insecticides for Crop Protection, by J. T. Martin; Problems in the Use of Insecticides, by A. B. Hadaway; Hazards and Precautions Associated with the Use of Pesticides, by J. M. Barnes and E. J. Miller; Research on Stored-Products Pests and Their Control, by D. W. Hall, J. A. Freeman, E. A. Parkin and A. A. Green; Biological Control of Insects and Weeds, by Frank Wilson; Insect Attack in Relation to the Physical Characters and Physiological State of the Plant, by N. D. Holmes and R. G. Fennah; Recent Investigations on Timber-Boring Beetles, by Tecwyn Jones and J. D. Bletchley; Termite Control in Afforestation Projects and

Constructional Timbers, by W. V. Harris and W. A. Sands; The Utilization of Pathogenic Organisms in the Control of Insect Pests, by K. M. Smith and L. L. J. Ossowski; Recent Advances and Current Trends in the Study and Control of Tsetse Flies and Trypanosomiasis, by J. Ford and K. S. Hocking; Developments in the Study of the Dispersal of Insects, by Z. V. Waloff and C. G. Johnson; Recent Research on Locusts and Their Control, by P. T. Haskell and R. C. Rainey; Developments in the Study of Plant Viruses and Their Vectors, and Their Bearing on Control Measures, by M. A. Watson, A. F. Posnette, J. S. Kennedy, and L. Broadbent; The Link Between Research Work and its Application in the Field of Plant Protection, by A. P. Arnason, F. H. Jacob, G. Watts- Padwick, A. R. Melville, and F. A. Squire.

F. W. P.

BIOLOGY CODE AND THE KEY TO THE BIOLOGY CODE OF THE CHEMICAL-BIOLOGICAL COORDINATION CENTER. Published by the National Academy of Sciences—National Research Council, Washington 25, D. C. 9 x 11 inches. Publ. No. 790, 222 pp.; Publ. No. 790 K, 210 pp. Two-Volume Set, $12.00; Separate Volumes, $7.00 each.

The Biology Code was developed by the Chemical-Biological Coordination Center and used by the Center for coding (indexing) its large collection of information for IBM punched card storage. It is the only code available which was designed to be used with information concerned with all organisms in both the plant and animal kingdom. Volume I contains the series of classification schemes, code items, and code symbols; Volume II is the *Key* which describes in turn each of the lists and gives explanations and instructions for the use of the code symbols. Each volume is available in a cloth binding for reference or library use and in a plastic spiral binding for easy desk or laboratory use.

The objectives of the publication go beyond the basic code lists and explanations. The CBCC was established to study and develop methods for storage-retrieval correlation of data from tests for biological response to chemicals —covering the entire spectrum of the chemical biological fields (pharmaceutical and clinical, plant growth regulation, insecticide, etc.). The CBCC, beginning in 1945, was the first large-scale effort in this area. These Volumes are the result of several years' development and comprise the record of a considerable and unique experience in reducing biological data to a coded form. An Introduction and Appendix to the *Code* have been included, giving in some detail the methods used and experience gained, and should be of value in future enterprises for handling biological information

F. W. P

THE SCIENTIFIC AMERICAN BOOK OF PROJECTS FOR THE AMATEUR SCIENTIST. Edited by C. L. Strong. With an introduction by Vannevar Bush. Simon and Schuster, 630 5th Avenue, New York 20, N. Y. 584 pp., 256 figs., 1960. $5.95.

This collection of 56 projects is adapted from corresponding articles appearing during the years 1952–60 in a monthly column of the Scientific American. Each was originally prepared either by an amateur or with use and enjoyment by an amateur in mind. The subject fields in which the articles are grouped are as follows: Astronomy; Archaeology; Biology; Natural Sciences; The Earth Sciences; Nuclear Physics; Mathematical Machines; Aerodynamics; Optics, Heat and Electronics. With the wide range of subjects, this book of carefully presented and well-illustrated material has a big potential of influence on young people and others with receptive minds.

Only one article deals with insects, this concerning the work of the late Col. Otto H. Schroeter, an amateur lepidopterist who not only made a large collection, now belonging to the University of Connecticut, but who was able to supply living material of many unusual species to laboratories for experimental biology. It may be noted, however, that the author of an article on the amateur study of algae, the late I. C. G. Cooper, a New York naval architect, comments that his botanical interests developed after an excursion on Staten Island with W. T. Davis, the late devoted naturalist and well-known student of cicadas.

The projects discussed range from the construction of inexpensive telescopes for beginners, through the organization of a group of amateur archaeologists, and how to live with reptiles and amphibians, to the making of cloud chambers and smoke tunnels, and to amateur rocketry and how to make an electric clock keep accurate time. There are references for further reading. All in all, it appears that for Science Fair contestants and all others who are of an inventive turn of mind, or just curious, this book is a most stimulating contribution.

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WONDER-WORKERS OF THE INSECT WORLD, by Hiran J. Herbert. Foreword by Dr. Lucy W. Clausen. Illustrated by Robert Gartland. E. P. Dutton & Co., Inc., New York, 1960. 5½ x 8¼ inches, 160 pp. Price, $3.00.

In this illuminating book of 15 chapters, the bizarre in the insect world is dramatically described and illustrated to attract and hold the attention of the entomologically uninformed reader. Although titled an insect book, two chapters are devoted to spiders: "Argiope, the Spinner" and "Lycosa, Sun Worshipper." Titles given some of the other chapters are: "Vendetta" (*Pompilus*), "Follow the Leader" (Dragonflies), "Insect of Prey" (Myrmeleontidae), "The Original Rip Van Winkle" (*Magicicada septendecim*), "Eumenes, the Jug of Life" (*Eumenes* spp.), "The Torch-bearer" (Lampyridae), "The Duches of Sphex" (*Ammophila* spp.), "Lady of Death" (*Aedes* spp.) and "Flowers That Fly" (Lepidoptera). Fascinating accounts are given of some of the astonishing activities of this teeming world of creatures.

F. W. P.

A DICTIONARY OF SCIENTIFIC TERMS—PRONUNCIATION, DERIVATION, AND DEFINITION OF TERMS IN BIOLOGY, BOTANY, ZOOLOGY, ANATOMY, CYTOLOGY, GENETICS, EMBRYOLOGY, PHYSIOLOGY, by I. F. Henderson and W. D. Henderson. Seventh Edition, by John H. Kenneth. D. Van Nostrand Company, Inc., Princeton, N. J. 1960. 6 x 9 inches, 595 pp. Price, $12.50. Printed in Great Britain by Oliver and Boyd Ltd., Edinburgh.

This dictionary was first published in 1920. This new edition includes some 1750 new terms and definitions bringing the total number to more than 15,500. The aim of the dictionary is to give the pronunciation, derivation, and definition of terms in biology, botany, zoology anatomy, cytology, genetics, embryology, and physiology. The work has been reset in order to retain the facility of reference afforded by an unbroken alphabetical arrangement. As in previous editions, the existing entries have been revised and, where appropriate, amplified with special attention being given to terms used in American text books. However, as was pointed out in the Preface to the Second Edition, "a work of this nature must inevitably remain subject to limitations of time and resources."

The method of spelling is mainly that used in Britain, but attention is paid to American orthography by means of cross-references or by reproducing in the original lettering terms culled from scientific literature published in the United States. Pronunciation, upon which there can never be universal agreement, is the least satisfactory part and is likely to remain so because it is subject to different fashions in different centers of learning. The above comments were taken largely from the author's preface and

are intended to serve as a recommendation of this book as a reference text for all biologists. It is printed on an excellent grade of paper and well bound for many years of use.

F. W. P.

ESTUDIO DE LOS TRIATOMINOS EN VENEZUELA, by Pablo Cova Garcia y Miguel A. Suárez. Publ. Div. Malariologia, No. 11, Ministerio de Sanidad y Asistencia Social. Caracas, Venez. 209 pp., illus.

This publication provides a useful review of the identity and distribution of Triatominae in Venezuela. All species of the subfamily known to occur in Venezuela are listed and illustrated by means of photographs or drawings. Unfortunately, most of the photographs are not well reproduced; however, together with a picture key to genera and a dichotomous key to species, adequate means of recognizing the 12 species known to occur in Venezuela are provided. Distribution for each species is cited by State, District (Municipio) and town (Centros Poblados) and related to factors of altitude, temperature, and rainfall.

Rhodnius prolixus is reported to be a domestic species prevalent throughout Venezuela. It is also the principal vector of Chagas disease. Since 1952, the Division de Malariologia has been engaged in a nationwide campaign for control of this disease which is said to afflict a large part of the population of Venezuela. The control program should benefit materially from the information presented here regarding the identity and distribution of the principal vectors.

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THE MONARCH BUTTERFLY, by F. A. Urquhart, University of Toronto Press, Toronto. xxiv + 361 pages, 79 text figs., 12 colored plates. Paper, $3.95; cloth, $6.50.

This book is, in effect, a consideration of the biology of the North American components of the monarch butterfly with special reference to migration. In it Dr. Urquhart, who is head of the Life Sciences Division of the Royal Ontario Museum, has brought together the results of many years' research on the migration of the monarch. In its later stages the study has been greatly enhanced by the assistance of more than 300 cooperators in various areas of the United States and Canada.

The text is divided into two sections, I General Discussion, and II Research Data and Reference Material, both of which cover the topics of foodplants, early stages, adult, nomenclature, population fluctuations, parasites and predators, mimicry, and migration. In the second section, pages 215 to 242 comprise a reprint of Dr. Paul R. Ehrlich's 1958 paper on the integumental anatomy of the adult, published in the University of Kansas Science Bulletin. Entomologists will find the first section of the book oversimplified, as it presents in popular style the topics mentioned above with a great deal of explanation. In the second part, detailed data are presented under each of the headings, which give a complete account of the material basis for the book. The author has, in my opinion, made the mistake of including too many data, a large amount of which could have been omitted or summarized without undue sacrifice in overall value. For example, several pages are used in listing the species of milkweed by state, yet discussion of the plant distribution patterns involved and their significance, if any, to the distribution of the butterfly are not given; detailed observations on variation in eggshell consumption by newly hatched larvae, on relocation of the foodplant by larvae, et cetera, are reported without interpretation; reports from cooperators on life history and migrational phases are given verbatim, and many of these do not add materially to the general conclusions. The section on migration, however, does give a more complete picture of the habits of one of the best known insect migrants than has previously been available, and many conclusions on phases of migration, effects of climatic conditions, overwintering, and breeding ranges are well presented. One of the most valuable sections is a complete report on the tagging systems utilized, including a resumé of the preliminary methods attempted and their disadvantages. Twenty separate listings in the extensive table of recoveries of tagged butterflies, of flights greater than 500 miles attest to the success of the method.

It is interesting to note that Dr. Urquhart believes the theory of Batesian mimicry is untenable, although the monarch and viceroy butterfly complex is one of the most popularly accepted examples. He is of the opinion that the monarch is not distasteful and that birds are not significant predators. He presents an alternate, hypothetical explanation involving a principle of protective resemblance to a nonspecific constant in nature. That he fails to mention and differentiate Muellerian mimicry in general statements about protective resemblances tends to confuse the problem somewhat.

The book will be of value to anyone interested in insect migration and it is a well documented addition to the literature on this subject. It is a nicely executed volume, and the 12 excellent colored plates illustrate various phases of the discussion well.

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A CONTRIBUTION TO THE HISTORY OF COMMERCIAL PEST CONTROL, by J. J. Davis, Purdue University, Published by the Author, 84 pp., 42 Illustrations, Paper Binding, $3.00

Anyone who has chuckled and laughed while reading Prof. Davis' *Memories of Years Agone—Mostly Entomological* will derive both pleasure and enlightenment from his latest work, *A Contribution to the History of Commercial Pest Control*. The reader will find here a great deal of new information on the early pest control operators, a number of whom established organizations that are now in the category of "big business". Prof. Davis also delves into the history of PCO courses, amateur insect clubs, monuments to insects, early insecticides, and other material of great interest to entomologists.

This paper-bound booklet has 86 pages of reduced but legible print, and an appendix of 42 fascinating illustrations that alone makes the publication worth having. We can only hope that some of our other senior entomologists will favor us with equally absorbing historical material.

ARNOLD MALLIS

NECROLOGY

FULTON, B. B. 71. Retired professor of entomology, North Carolina State College. Forty-eight year, emeritus member. Fellow (1932) of the former Entomological Society of America. In Raleigh, North Carolina, December 8, 1960.

LAMBRECH, JOSEPH A. 44. Union Carbide Chemicals Company insecticide chemist. In Charleston (West Va.) Memorial Hospital, December 23, 1960.

MEINERS, E. P. 67. Physician and amateur entomologist. In St. Louis, Missouri, October 28, 1960.

STENE, A. E. 88. Retired state entomologist of Rhode Island. Emeritus member. In Wakefield, Rhode Island, December 25, 1960.

WADE, JOSEPH S. 80. Retired U.S.D.A. economic entomologist. Forty-six year, emeritus member. Fellow (1937) of the former Entomological Society of America. At his home in Washington, D. C., January 1, 1961.

Notice of

THE ANNUAL MEETING

Entomological Society of America

MIAMI, FLORIDA, NOVEMBER 27-30, 1961

Program Highlights and a tear sheet for those wishing to present papers at the Miami meeting will be included in the June, 1961 BULLETIN. Make plans now to attend and to send in your program information early. The deadline for receipt of titles and synopses is August 15, 1961.

Chairman of the *Program Committee*
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